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# ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES

## DURING THE CALENDAR YEAR 1921

BY

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# ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES DURING THE CALENDAR YEAR 1921.

By William W. Adams.

## INTRODUCTION.

During the calendar year 1921 accidents at mills, smelters (excluding iron blast furnaces), and auxiliary works resulted in fewer deaths and injuries among the workmen than during any year since 1913, the first year for which operating companies furnished accident reports to the United States Bureau of Mines. The reports show 27 men killed and 4,494 injured (disability more than 1 day) as compared with 61 killed and 8,863 injured in 1920.

The reduction in accidents was due largely to the fact that many plants were shut down and others were operated only part of the year, but it is gratifying to note also that there were fewer accidents in proportion to the number of men working. In 1921, for every thousand men employed the fatality rate was 0.76 and the injury rate was 126.74 as compared with 0.93 killed and 135.14 injured in 1920. These rates are based upon a standard of 300 work days a year.

The average number of men working during the year was 37,465; they worked a total of 10,637,636 shifts, or 284 days per man. As compared with 1920, these figures indicate a reduction of 37 per cent in the number of employees, 46 per cent in shifts worked, and 15 per cent in average work days per man.

The accidents covered by this report are segregated into three main groups, namely, those at ore-dressing plants, those at smelters (excluding iron blast furnaces) and those at auxiliary works of mills and smelters. For the ore-dressing plants the accident rates in 1921 per thousand men employed were 0.50 killed and 151.05 injured; for smelters, 0.73 killed and 111.39 injured; for auxiliary works, 1.08 killed and 138.54 injured.

Of the 4,521 accidents during the year, 0.60 per cent were fatal, 0.84 per cent resulted in permanent partial disability, 22.67 per cent caused temporary disability of more than 14 days, and 75.89 per cent resulted in disability of more than 1 day but not more than 14 days.

Table 1 presents a summary of the accident and labor data relating to accidents at metallurgical plants since 1913, the first year for which the Bureau of Mines received accident reports from operators of mills and smelters. A summary of all accidents by States and causes is given in Tables 6 and 7.

## ACKNOWLEDGMENTS.

The Bureau of Mines gratefully acknowledges the cooperation of owners and operators of metallurgical plants and of others interested in the metallurgical industry who have voluntarily furnished the data upon which the tables in this report are based.

Data for California were furnished by the industrial accident commission of that State. For assistance in the compilation of the various tables, credit is due Miss L. S. Gerry, of the Bureau of Mines.

## SCOPE OF STATISTICS.

The tables in this paper have been compiled by the Bureau of Mines from reports furnished voluntarily by operators of ore-dressing plants and smelters, with the exception of the data for California. The statistics represent the entire metallurgical industry, except iron blast-furnace plants, accident reports for those not being received by the Bureau of Mines. The figures for smelting plants cover copper, lead, gold, and silver smelters and refineries; those for ore-dressing plants represent concentrating plants for copper ores, lead ores, zinc ores, stamp mills, cyanide plants, iron-ore washers, flotation mills, and sampling works.

TABLE 1.—*Summary of labor and accidents at metallurgical plants.*

| | Men employed. | | Days of labor performed. | Average days active. | Total number killed. | Number killed per 1,000 300-day workers. | Total number injured. | Number injured per 1,000 300-day workers. |
|---|---|---|---|---|---|---|---|---|
| | Actual number. | 300-day workers. | | | | | | |
| Ore-dressing plants: | | | | | | | | |
| 1913 | 14,985 | 16,154 | 4,846,338 | 323 | 16 | 0.99 | 1,977 | 122.38 |
| 1914 | 15,128 | 15,225 | 4,567,529 | 302 | 23 | 1.51 | 1,434 | 94.19 |
| 1915 | 18,564 | 19,107 | 5,732,184 | 309 | 30 | 1.57 | 2,095 | 109.65 |
| 1916 [1] | 22,365 | 23,470 | 7,041,083 | 315 | 33 | 1.41 | 3,184 | 135.66 |
| 1917 [1] | 24,111 | 24,372 | 7,311,499 | 303 | 47 | 1.93 | 2,952 | 121.12 |
| 1918 [1] | 21,809 | 22,517 | 6,754,962 | 310 | 35 | 1.55 | 3,142 | 139.54 |
| 1919 [1] | 17,262 | 16,862 | 5,058,545 | 293 | 25 | 1.48 | 2,057 | 122.21 |
| 1920 [1] | 16,827 | 16,813 | 5,043,911 | 300 | 21 | 1.25 | 2,624 | 156.07 |
| 1921 [1] | 10,047 | 8,037 | 2,411,148 | 240 | 4 | .50 | 1,214 | 151.05 |
| Smelting plants: [2] | | | | | | | | |
| 1913 | 20,564 | 24,309 | 7,292,766 | 355 | 47 | 1.93 | 4,247 | 174.71 |
| 1914 | 27,879 | 32,336 | 9,700,769 | 348 | 33 | 1.02 | 5,673 | 175.44 |
| 1915 | 31,327 | 36,262 | 10,878,486 | 347 | 38 | 1.05 | 5,718 | 157.69 |
| 1916 [1] | 43,829 | 49,363 | 14,809,046 | 338 | 36 | .73 | 9,656 | 195.61 |
| 1917 [1] | 44,376 | 50,659 | 15,197,643 | 342 | 53 | 1.05 | 7,745 | 152.88 |
| 1918 [1] | 39,899 | 45,439 | 13,631,601 | 342 | 42 | .92 | 6,743 | 148.40 |
| 1919 [1] | 28,777 | 31,324 | 9,397,082 | 327 | 34 | 1.09 | 4,431 | 141.46 |
| 1920 [1] | 26,099 | 30,411 | 9,123,186 | 350 | 20 | .66 | 4,147 | 136.37 |
| 1921 [1] | 18,656 | 19,113 | 5,733,969 | 307 | 14 | .73 | 2,129 | 111.39 |
| Auxiliary works: | | | | | | | | |
| 1913, 1914, 1915 [3] | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| 1916 | 14,007 | 15,763 | 4,729,010 | 338 | 14 | .89 | 2,240 | 142.10 |
| 1917 | 15,555 | 17,014 | 5,104,146 | 328 | 16 | .94 | 2,881 | 169.33 |
| 1918 | 18,044 | 20,111 | 6,033,184 | 334 | 17 | .85 | 2,808 | 139.63 |
| 1919 | 15,081 | 16,172 | 4,851,726 | 322 | 5 | .31 | 1,638 | 101.29 |
| 1920 | 16,306 | 18,363 | 5,508,756 | 338 | 20 | 1.08 | 2,092 | 113.92 |
| 1921 | 8,762 | 8,308 | 2,492,519 | 284 | 9 | 1.08 | 1,151 | 138.54 |

---

[1] Not including auxiliary works, as shops, yards, etc.
[2] Exclusive of iron blast furnaces.
[3] Not separately reported.

## CLASSIFICATION OF ACCIDENTS.

As a step toward uniformity in the statistical presentation of the hazards of the metallurgical and mining industries, the Bureau of Mines in 1916 classified the nonfatal injuries on a 14-day (2 weeks) basis, thus conforming with the classification adopted in the compensation laws of many States. A summary of accidents at mills, smelters, and auxiliary works on this basis for 1916 to 1921 follows:

*Fatal and nonfatal accidents, 1916–1921.*

| | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
|---|---|---|---|---|---|---|
| 1. Fatal | 83 | 116 | 94 | 64 | 61 | 27 |
| 2. Serious (time lost, more than 14 days): | | | | | | |
| Permanent disability— | | | | | | |
| Total [1] | 17 | 5 | 7 | 2 | 2 | 0 |
| Partial [2] | 200 | 202 | 247 | 71 | 147 | 38 |
| Others | 3,443 | 3,302 | 3,028 | [3] 1,869 | [3] 1,990 | [3] 1,025 |
| 3. Slight (time lost, 1 to 14 days, inclusive) | 11,420 | 10,069 | 9,411 | 6,184 | 6,724 | 3,431 |
| Total nonfatal injuries | 15,080 | 13,578 | 12,693 | 8,126 | 8,863 | 4,494 |
| Grand total (fatal and nonfatal) | 15,163 | 13,694 | 12,787 | 8,190 | 8,924 | 4,521 |
| Men employed | 80,201 | 84,042 | 79,752 | 61,120 | 59,232 | 37,465 |

[1] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[2] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[3] "Other serious accidents" in 1919 include 50 cases of permanent partial disability; in 1920, 72 cases of permanent partial disability and 1 case of permanent total disability; and in 1921, 18 cases of permanent partial disability and 2 cases of permanent total disability.

## ACCIDENTS AT ORE-DRESSING PLANTS.

Ore-dressing plants operating in 1921 employed 10,047 men, who worked 2,411,148 shifts, an average of 240 work days per man. Of these employees 4 were killed and 1,214 were injured, a decrease of 17 fatalities and 1,410 injuries, as compared with the previous year. The accident rates were 0.50 killed and 151.05 injured per thousand employees (300-day workers). For the previous year the corresponding rates were 1.25 killed and 156.07 injured. The average working time per man indicates a loss of 60 days as compared with the previous year. The number of employees fell off 40 per cent and there was a decrease of 52 per cent in total shifts worked.

One of the fatalities was caused by haulage equipment, one by crushers, rolls, or stamps, and two by other machinery.

Of the nonfatal injuries, the principal causes stated in the order of the number of resulting injuries, were falls of persons, "other machinery," hand tools, falling objects, flying pieces of rock from sledging or crushing, and crushers, rolls, or stamps.

## ACCIDENTS AT SMELTERS.

The smelting industry (not including iron blast furnaces) employed 18,656 men in 1921; the total working time was 5,733,969 shifts, and each employee averaged 307 days of work during the year. Accidents killed 14 employees and injured 2,129 others, a reduction of 6 fatalities and 2,018 injuries from the preceding year's record. The accident rates, based upon 300 shifts to the year, were 0.73 killed and 111.39 injured per thousand men employed. For 1920 the corresponding rates were 0.66 killed and 136.37 injured.

The figures for 1921 as compared with those for 1920 represent a decrease of 7,443 employees, or 29 per cent, and 3,389,217 shifts, or 37 per cent. The average work year represents a loss of 43 days per employee.

Of the 14 fatalities, 2 each were due to haulage equipment, "other machinery," falls of persons, and suffocation in ore bins; one each to flying or falling objects, scalding, burns from matte, slag, or molten metal; and three to miscellaneous causes.

Of the 2,129 nonfatal injuries, 401 were due to burns from matte, slag, or molten metal; 287 to flying or falling objects, 179 to hand tools, 146 to falls of persons, and 121 to haulage equipment. The remaining causes resulted in less than 100 injuries each.

## ACCIDENTS AT AUXILIARY WORKS.

The statistics for auxiliary works cover machine shops, yards, and general construction. These works, auxiliary to the mills and smelters, employed 8,762 men in 1921, 46 per cent less than in 1920. A total of 2,492,519 shifts was worked, an average of 284 working days per man, thus indicating a loss of 3,016,237 shifts (55 per cent) and 54 days per man (16 per cent) as compared with the year before. Nine employees were killed by accidents and 1,151 were injured. Based on a standard of 300 working days to the year, the accident rates were 1.08 killed and 138.54 injured per thousand employees, as against 1.08 killed and 113.92 injured in 1920.

Two of the 9 fatalities were caused by railway cars and locomotives, 1 each by plant haulage equipment, fall of person, machinery, and 4 resulted from miscellaneous causes.

Of the 1,151 injuries, 174 were due to falling objects, 140 to hand tools, 125 to falls of persons, 90 to machinery, and 70 to nails and splinters. The remaining injuries resulted from various causes, although 418 were charged to "miscellaneous," the specific cause not being stated.

## ACCIDENTS AT COPPER MILLS AND SMELTERS.

Mills and smelters treating copper ores represent an important part of the metallurgical industry of the United States and one that is readily segregated. Tables 15 and 16 have therefore been compiled from the reports of a selected list of copper companies whose accident records appeared reasonably complete. The tables are based on reports covering 28 ore-dressing plants in eight States and 23 smelters in 10 States, employing 2,286 men working 435,069 shifts at mills and 5,339 men working 1,346,976 shifts at smelters. It is believed that the figures are fairly representative of the accident hazards at metallurgical plants treating copper ores in 1921. Similar figures have been compiled since 1915.

## IMPORTANCE OF COMPLETE ACCIDENT RECORDS.

Complete and accurate statistics of accidents are a necessary basis for intelligent and effective safety work in any large industry. By no other means may the hazards of different classes of work be studied with reference to the relative frequency and severity of accidents. Moreover, without correct records, based on full and complete accident reports, there can be no definite measurement of progress in safety work from year to year; hence the actual "value received" for money expended on safety education and equipment remains more or less a matter of conjecture.

The annual expenditure of money, time, and effort by employers in industry to prevent accidents to their workmen warrants a more scientific study of the results accomplished. It is well enough for employers to feel the sense of satisfaction that comes from having endeavored to safeguard their men from death or injury, but executives are entitled to more definite knowledge as to what real benefits have followed their efforts to improve the working conditions of their employees. Proper accident records and accurate statistical studies based thereon serve the double purpose of facilitating safety work and informing the executives of the results accomplished.

As a proper basis for a scientific study of accident frequency and severity, records should be kept not only of the accidents that occur, but also of the number of hours of exposure to hazard for each group of employees engaged on a distinct kind of work. Such records necessarily involve considerable work; but the labor is amply justified, not only by the present large number of deaths and injuries that occur annually in industrial plants, but by the large sums of money that are now being spent for safety work throughout the country.

The Bureau of Mines will be glad to discuss this subject more in detail with any company desiring to enter upon a more intensive study looking to the prevention of accidents in the mineral industry.

## STATISTICAL TABLES.

The following tables show the classification and the number of accidents at metallurgical works in the United States during the calendar year 1921:

TABLE 2.—*Number of men employed, number of days worked, and number of men killed and injured at metallurgical plants in the United States during the year ended December 31, 1921.*

| State. | Ore-dressing plants. | | | | | Smelting plants. | | | | | Auxiliary works. | | | | | Widows. | Orphans. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men employed. | Days of labor performed. | Average days active. | Killed. | Injured. | Men employed. | Days of labor performed. | Average days active. | Killed. | Injured. | Men employed. | Days of labor performed. | Average days active. | Killed. | Injured. | | |
| Alabama | 45 | 3,594 | 80 | | | | | | | | (1) | | | | | | |
| Alaska [2] | 580 | 175,810 | 303 | 1 | 12 | | | | | | | | | | | 1 | |
| Arizona | 773 | 157,086 | 203 | | 93 | 1,628 | 185,256 | 114 | 2 | 152 | 729 | 187,072 | 257 | 1 | 106 | 1 | |
| Arkansas | (1) | | | | | 270 | 58,040 | 215 | | 39 | 96 | 25,286 | 263 | | 3 | | |
| California [3] | 378 | 103,516 | 274 | | 66 | 313 | 98,930 | 316 | | 33 | 427 | 114,478 | 268 | | 22 | | |
| Colorado | 670 | 190,125 | 284 | | 79 | 513 | 157,375 | 307 | 1 | 33 | 250 | 62,318 | 249 | | 8 | 1 | |
| Idaho | 367 | 95,088 | 259 | 1 | 26 | (1) | | | | | 159 | 57,223 | 359 | | 7 | | |
| Illinois | 80 | 20,096 | 251 | | 5 | 950 | 307,960 | 324 | | 177 | 543 | 139,727 | 257 | | 86 | | |
| Kansas | 137 | 36,208 | 264 | 1 | 61 | (1) | | | | | (1) | | | | | | |
| Michigan | 918 | 224,616 | 245 | | 43 | 468 | 83,110 | 178 | | 72 | 150 | 44,625 | 297 | | 55 | | |
| Minnesota | 276 | 41,623 | 151 | | 27 | | | | | | (1) | | | | | | |
| Missouri | 628 | 185,891 | 296 | | 92 | (1) | | | | | 590 | 190,834 | 323 | 1 | 180 | | |
| Montana | 509 | 98,417 | 193 | | 38 | 648 | 166,364 | 257 | 2 | 52 | 1,287 | 248,773 | 193 | 1 | 65 | 1 | |
| Nevada | 494 | 122,258 | 247 | | 85 | 213 | 31,098 | 146 | | 30 | 84 | 18,115 | 216 | | 13 | | |
| New Jersey | 441 | 111,028 | 252 | | 27 | 1,742 | 635,830 | 365 | 1 | 197 | 933 | 323,417 | 347 | 1 | 90 | 1 | 1 |
| New Mexico | 267 | 29,657 | 111 | | 9 | (1) | | | | | 168 | 17,418 | 104 | 1 | 12 | | |
| New York | 619 | 151,797 | 245 | | 113 | (1) | | | | | 162 | 43,158 | 266 | | 94 | | |
| Oklahoma | 353 | 57,752 | 164 | | 80 | 985 | 235,383 | 239 | | 107 | 233 | 60,859 | 261 | | 46 | | |
| Oregon | 28 | 1,278 | 46 | | 1 | (1) | | | | | 11 | 387 | 35 | | 2 | | |
| Pennsylvania | (1) | | | | | 1,659 | 583,709 | 352 | | 398 | 1,217 | 423,605 | 348 | | 97 | | |
| South Dakota | 241 | 87,413 | 363 | | 30 | | | | | | | | | | | | |
| Tennessee | 197 | 33,285 | 169 | | 18 | (1) | | | | | 486 | 169,417 | 349 | 4 | 138 | 4 | 10 |
| Texas | (1) | | | | | 4,509 | 1,641,517 | 364 | | 18 | 11 | 2,111 | 192 | | 4 | | |
| Utah [4] | 738 | 183,705 | 249 | 1 | 110 | 1,272 | 410,655 | 323 | 2 | 110 | 537 | 146,861 | 273 | | 9 | | |
| Vermont | 48 | 11,189 | 233 | | 3 | | | | | | (1) | | | | | | |
| Virginia | 112 | 16,982 | 152 | | 4 | (1) | | | | | 35 | 6,610 | 189 | | 5 | | |
| Washington | 26 | 4,065 | 156 | | 1 | (1) | | | | | (1) | | | | | | |
| West Virginia | | | | | | 358 | 115,145 | 321 | 2 | 91 | (1) | | | | | 2 | 8 |
| Wisconsin | 69 | 8,981 | 130 | | 2 | (1) | | | | | | | | | | | |
| Other States | 1,053 | 259,688 | 247 | | 189 | 3,128 | 1,023,597 | 327 | 4 | 620 | 654 | 210,225 | 321 | | 109 | 4 | 9 |
| **Total, 1921** | **10,047** | **2,411,148** | **240** | **4** | **1,214** | **18,656** | **5,733,969** | **307** | **14** | **2,129** | **8,762** | **2,492,519** | **284** | **9** | **1,151** | **15** | **28** |
| **Total, 1920** | **16,827** | **5,043,911** | **300** | **21** | **2,624** | **26,099** | **9,123,186** | **350** | **20** | **4,147** | **16,306** | **5,508,756** | **338** | **20** | **2,092** | **34** | **67** |

[1] Included in "Other States."

[2] Stamp mills, other than at lode mines, not included.

[3] Figures relating to California, in this and all other tables, were supplied by the Industrial Accident Commission of the State of California, San Francisco, Calif.

[4] Figures relating to Utah, in this and all other tables, were supplied by the Industrial Accident Commission, Salt Lake City, Utah.

TABLE 3.—***Metallurgical plants:*** *Fatalities, by causes and*

| State. | Ore-dressing plants.[1] | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Haulage system (cars, motors, etc.). | Railway cars and locomotives. | Crushers, rolls, or stamps. | Tables, jigs, etc. | Other machinery. | Falls of persons. | Suffocation in ore bins. | Falling objects (rocks, timbers, etc.). | Cyanide or other poisoning. | Scalding (steam or water). | Electricity. | Hand tools, axes, bars, etc. | Nails, splinters, etc. | Flying pieces of rock from sledging or crushing. | Other causes. | **Total.** |
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | |
| Alabama | | | | | | | | | | | | | | | | |
| Alaska | | | | | 1 | | | | | | | | | | | **1** |
| Arizona | | | | | | | | | | | | | | | | |
| Colorado | | | | | | | | | | | | | | | | |
| Idaho | | | | | 1 | | | | | | | | | | | **1** |
| Kansas | | | 1 | | | | | | | | | | | | | **1** |
| Missouri | | | | | | | | | | | | | | | | |
| Montana | | | | | | | | | | | | | | | | |
| New Jersey | | | | | | | | | | | | | | | | |
| New Mexico | | | | | | | | | | | | | | | | |
| Tennessee | | | | | | | | | | | | | | | | |
| Texas | | | | | | | | | | | | | | | | |
| Utah | 1 | | | | | | | | | | | | | | | **1** |
| West Virginia | | | | | | | | | | | | | | | | |
| Other States | | | | | | | | | | | | | | | | |
| **Total, 1921** | **1** | | **1** | | **2** | | | | | | | | | | | **4** |
| Total, 1920 | 1 | | 2 | | 8 | 2 | 4 | | | | 2 | | | | 2 | **21** |

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[1] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

*States, during the year ended December 31, 1921.*

| Smelting plants.[2] | | | | | | | | | | | | | | | | Auxiliary works.[3] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Haulage system (cars, motors, etc.). | Railway cars and locomotives. | Cranes. | Other machinery. | Falls of persons. | Suffocation in ore bins. | Flying or falling objects (rocks, timber, etc.). | Gas (burns or asphyxiation). | Scalding (steam or water). | Electricity. | Hand tools, axes, bars, etc. | Nails, splinters, etc. | Burns from matte, slag, or molten metal (pouring or spilling). | Hot-metal explosion. | Other causes. | Total. | Haulage system (cars, motors, etc.). | Railway cars and locomotives. | Falls of persons. | Falling objects (rocks, timbers, etc.). | Nails, splinters, etc. | Hand tools, axes, bars, etc. | Electricity. | Machinery. | Failure of ladder, scaffold, or other support. | Handling hot materials. | Other causes. | Total. |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1 | | | | | | | 1 | | | 2 | | | 1 | | | | | | | | | 1 |
| 1 | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | 1 |
| | | | | | 1 | | | | | | | | | 1 | 2 | | | | | | | | 1 | | | | 1 |
| | | | | | | | | 1 | | | | | | | 1 | | 1 | | | | | | | | | | 1 |
| | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | 1 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | 4 | 4 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | 1 | | | | | | | | | | | | 2 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 2 | 2 | | | | | | | | | | | | |
| | | | 1 | 2 | | 1 | | | | | | | | | 4 | | | | | | | | | | | | |
| 2<br>4 | ...<br>... | ...<br>... | 2<br>5 | 2<br>3 | 2<br>... | 1<br>3 | ...<br>... | 1<br>1 | ...<br>1 | ...<br>... | ...<br>... | 1<br>... | ...<br>1 | 3<br>2 | 14<br>20 | 1<br>5 | 2<br>6 | 1<br>2 | ...<br>3 | ...<br>... | ...<br>... | ...<br>... | 1<br>2 | ...<br>1 | ...<br>... | 4<br>1 | 9<br>20 |

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[2] Blast, reverberatory, and roasting furnaces, convertors, casting department, and refineries.
[3] Yards, shops, construction, etc.

TABLE 4.—***Metallurgical plants:*** *Injuries, by causes and*

| State. | Ore-dressing plants.[1] | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Haulage system (cars, motors, etc.). 1 | Railway cars and locomotives. 2 | Crushers, rolls, or stamps. 3 | Tables, jigs, etc. 4 | Other machinery. 5 | Falls of persons. 6 | Suffocation in ore bins. 7 | Falling objects (rocks, timbers, etc.). 8 | Cyanide or other poisoning. 9 | Scalding (steam or water). 10 | Electricity. 11 | Hand tools, axes, bars, etc. 12 | Nails, splinters, etc. 13 | Flying pieces of rock from sledging or crushing. 14 | Other causes. 15 | **Total.** |
| Alaska | .... | .... | 1 | .... | 4 | 1 | .... | 3 | .... | .... | .... | 2 | .... | .... | 1 | **12** |
| Arizona | 1 | 1 | 7 | 2 | 7 | 11 | .... | 13 | .... | .... | 2 | 3 | 1 | 6 | 39 | **93** |
| Arkansas | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| California | 4 | 3 | .... | .... | 7 | 15 | .... | 5 | 1 | .... | 3 | 5 | 4 | 5 | 14 | **66** |
| Colorado | 2 | 2 | 4 | .... | 9 | 7 | .... | .... | .... | 4 | 4 | 9 | 2 | 1 | 35 | **79** |
| Idaho | 1 | .... | 2 | .... | 5 | 2 | .... | 1 | .... | .... | 1 | 3 | 3 | 1 | 7 | **26** |
| Illinois | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 | **5** |
| Kansas | 7 | .... | 2 | 1 | 1 | 5 | 4 | 5 | .... | 10 | .... | 6 | .... | 6 | 14 | **61** |
| Michigan | 1 | .... | 1 | 1 | 6 | 6 | .... | 4 | .... | .... | .... | 4 | .... | 5 | 15 | **43** |
| Minnesota | 2 | 3 | 1 | .... | 1 | 4 | .... | 5 | .... | .... | .... | 3 | 1 | .... | 7 | **27** |
| Missouri | 3 | .... | 13 | 5 | 13 | 8 | .... | 4 | .... | .... | 1 | 7 | 6 | 12 | 20 | **92** |
| Montana | 3 | 1 | 5 | .... | 4 | 7 | .... | 3 | .... | .... | 1 | 1 | .... | .... | 13 | **38** |
| Nevada | 6 | 1 | 1 | .... | 11 | 6 | .... | 6 | 3 | .... | 1 | 10 | 2 | .... | 38 | **85** |
| New Jersey | .... | .... | .... | .... | 1 | 4 | .... | 6 | .... | .... | 1 | 1 | 1 | .... | 13 | **27** |
| New Mexico | .... | 1 | .... | .... | .... | 1 | .... | 2 | .... | .... | .... | 1 | .... | .... | 4 | **9** |
| New York | 3 | 2 | 11 | .... | 18 | 13 | .... | 21 | .... | .... | 3 | 13 | 6 | 5 | 18 | **113** |
| Oklahoma | 3 | 1 | 9 | 8 | 2 | 10 | 1 | 3 | .... | .... | .... | 5 | 12 | 12 | 14 | **80** |
| Oregon | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | **1** |
| Pennsylvania | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| South Dakota | 2 | .... | 8 | .... | 1 | 1 | .... | 1 | .... | .... | .... | 4 | .... | .... | 13 | **30** |
| Tennessee | 2 | .... | .... | .... | 3 | 4 | .... | 1 | .... | 1 | 1 | 4 | .... | .... | 2 | **18** |
| Texas | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Utah | 8 | 2 | .... | .... | 11 | 19 | .... | 1 | .... | 1 | 2 | 20 | 7 | 14 | 25 | **110** |
| Vermont | .... | .... | 1 | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | **3** |
| Virginia | 1 | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | 1 | **4** |
| Washington | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | **1** |
| West Virginia | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Wisconsin | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | **2** |
| Other States | 4 | .... | 2 | .... | 24 | 8 | .... | 15 | .... | 6 | 4 | 7 | 18 | 5 | 96 | **189** |
| **Total, 1921** | **53** | **17** | **70** | **17** | **130** | **132** | **5** | **99** | **4** | **22** | **24** | **108** | **64** | **73** | **396** | **1,214** |
| Total, 1920 | 127 | 24 | 102 | 42 | 288 | 323 | 4 | 283 | 16 | 22 | 36 | 261 | 120 | 179 | 797 | **2,624** |

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[1] Stamp mills, sampling works, slime plants ,lixiviation, leaching, cyanide, and flotation mills.
[2] Blast, reverberatory, and roasting furnaces, convertors, casting department, and refineries.
[3] Yards, shops, construction, etc.

***States, during the year ended December 31, 1921.***

| Smelting plants.[2] | | | | | | | | | | | | | | | | Auxiliary works.[3] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Haulage system (cars, motors, etc.). | Railway cars and locomotives. | Cranes. | Other machinery. | Falls of persons. | Suffocation in ore bins. | Flying or falling objects (rocks, timber, etc.). | Gas (burns or asphyxiation). | Scalding (steam or water). | Electricity. | Hand tools, axes, bars, etc. | Nails, splinters, etc. | Burns from matte, slag, or molten metal (pouring or spilling). | Hot-metal explosion. | Other causes. | Total. | Haulage system (cars, motors, etc.). | Railway cars and locomotives. | Falls of persons. | Falling objects (rocks, timbers, etc.). | Nails, splinters, etc. | Hand tools, axes, bars, etc. | Electricity. | Machinery. | Failure of ladder, scaffold, or other support. | Handling hot materials. | Other causes. | Total. |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | |
| 11 | ... | 8 | 8 | 12 | ... | 27 | ... | 1 | 1 | 17 | 3 | 22 | 2 | 40 | **152** | 2 | 5 | 11 | 29 | 9 | 17 | 2 | 2 | 1 | 4 | 24 | **106** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 19 | ... | 20 | **39** | ... | ... | ... | 2 | 1 | ... | ... | ... | ... | ... | ... | **3** |
| 8 | ... | ... | ... | 3 | ... | 5 | ... | ... | ... | 2 | ... | 3 | 2 | 10 | **33** | ... | ... | 6 | 2 | 3 | 3 | ... | 3 | ... | ... | 5 | **22** |
| 7 | 2 | 1 | 5 | 4 | ... | 3 | ... | 1 | ... | 4 | ... | 4 | 1 | 1 | **33** | 2 | ... | ... | 3 | ... | ... | ... | ... | ... | ... | 3 | **8** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | 1 | ... | ... | 2 | 2 | ... | ... | 1 | ... | **7** |
| 14 | 1 | 1 | 2 | 7 | ... | 17 | ... | 2 | ... | 15 | 5 | 46 | 1 | 66 | **177** | 10 | 1 | 12 | 13 | 4 | 10 | 1 | 2 | 1 | ... | 32 | **86** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | 4 | ... | 1 | 12 | ... | 3 | ... | 1 | ... | 11 | 2 | 6 | ... | 32 | **72** | 1 | ... | 9 | 3 | 8 | 3 | ... | 5 | ... | 1 | 25 | **55** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 | 2 | 14 | 11 | 8 | 28 | 1 | 20 | ... | 2 | 92 | **180** |
| 7 | ... | 2 | ... | 5 | ... | 12 | ... | ... | ... | 4 | ... | 4 | 2 | 16 | **52** | 3 | 2 | 5 | 12 | ... | 6 | 1 | 7 | ... | ... | 29 | **65** |
| ... | ... | ... | 4 | 4 | ... | 5 | ... | ... | 1 | 3 | 3 | 1 | 1 | 8 | **30** | 1 | 1 | 3 | 2 | ... | 1 | ... | 3 | ... | ... | 2 | **13** |
| 3 | 12 | 8 | 3 | 27 | ... | 34 | 1 | 7 | ... | 9 | 4 | 43 | 9 | 37 | **197** | 2 | 7 | 15 | 21 | 3 | 4 | 2 | 3 | ... | 6 | 27 | **90** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | 1 | ... | ... | 3 | 1 | 2 | 1 | ... | 3 | **12** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 | 2 | 7 | 7 | 3 | 8 | ... | 8 | 1 | ... | 56 | **94** |
| 8 | ... | ... | 7 | 6 | ... | 16 | 4 | 1 | ... | 6 | 1 | 38 | 5 | 15 | **107** | 6 | ... | 6 | 10 | 2 | 6 | ... | 4 | 2 | ... | 10 | **46** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | **2** |
| 22 | ... | ... | 5 | 20 | ... | 49 | 3 | 6 | ... | 37 | 13 | 45 | 3 | 195 | **398** | 4 | ... | 11 | 12 | 2 | 9 | 3 | 4 | ... | ... | 52 | **97** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 5 | 9 | 12 | 35 | 13 | 24 | ... | 7 | 1 | 6 | 26 | **138** |
| 1 | 1 | 1 | 1 | 4 | ... | 4 | 4 | ... | ... | 2 | ... | ... | ... | ... | **18** | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | 3 | **4** |
| 12 | 4 | 5 | 7 | 14 | ... | 12 | 1 | ... | 1 | 8 | 4 | 15 | 2 | 25 | **110** | ... | ... | 3 | 2 | ... | ... | ... | 2 | ... | ... | 2 | **9** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | 3 | ... | 1 | **5** |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 2 | ... | ... | 1 | ... | ... | ... | ... | ... | ... | 2 | 1 | 58 | 1 | 26 | **91** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 26 | 4 | 6 | 52 | 28 | ... | 100 | 2 | 1 | 3 | 59 | 15 | 97 | 26 | 201 | **620** | 3 | 4 | 7 | 10 | 14 | 16 | ... | 16 | ... | 13 | 26 | **109** |
| **121** | **28** | **32** | **96** | **146** | ... | **287** | **15** | **20** | **6** | **179** | **51** | **401** | **55** | **692** | **2,129** | **44** | **34** | **125** | **174** | **70** | **140** | **13** | **90** | **10** | **33** | **418** | **1,151** |
| 238 | 72 | 51 | 185 | 295 | 4 | 609 | 40 | 47 | 23 | 414 | 87 | 897 | 62 | 1,123 | 4,147 | 83 | 45 | 194 | 374 | 132 | 275 | 28 | 152 | 32 | 62 | 715 | 2,092 |

TABLE 5.—***Metallurgical plants:*** *Percentage of fatalities and injuries, by causes, during the year ended December 31, 1921.*

| Cause of accident. | Killed. | | | Injured. | | |
|---|---|---|---|---|---|---|
| | Number killed. | Per cent of group total. | Per cent of grand total. | Number injured. | Per cent of group total. | Per cent of grand total. |
| Ore-dressing plants: | | | | | | |
| 1. Haulage system (cars, motors, etc.) | 1 | 25.00 | 3.70 | 53 | 4.37 | 1.18 |
| 2. Railway cars and locomotives | ....... | ....... | ....... | 17 | 1.40 | .38 |
| 3. Crushers, rolls, or stamps | 1 | 25.00 | 3.70 | 70 | 5.77 | 1.56 |
| 4. Tables, jigs, etc | ....... | ....... | ....... | 17 | 1.40 | .38 |
| 5. Other machinery | 2 | 50.00 | 7.41 | 130 | 10.71 | 2.89 |
| 6. Falls of persons | ....... | ....... | ....... | 132 | 10.87 | 2.94 |
| 7. Suffocation in ore bins | ....... | ....... | ....... | 5 | .41 | .11 |
| 8. Falling objects (rocks, timbers, etc.) | ....... | ....... | ....... | 99 | 8.15 | 2.20 |
| 9. Cyanide or other poisoning | ....... | ....... | ....... | 4 | .33 | .09 |
| 10. Scalding (steam or water) | ....... | ....... | ....... | 22 | 1.81 | .49 |
| 11. Electricity | ....... | ....... | ....... | 24 | 1.98 | .53 |
| 12. Hand tools, axes, bars, etc | ....... | ....... | ....... | 108 | 8.90 | 2.40 |
| 13. Nails, splinters, etc | ....... | ....... | ....... | 64 | 5.27 | 1.42 |
| 14. Flying pieces of rock from sledging or crushing | ....... | ....... | ....... | 73 | 6.01 | 1.63 |
| 15. Other causes | ....... | ....... | ....... | 396 | 32.62 | 8.81 |
| **Total** | **4** | **100.00** | **14.81** | **1,214** | **100.00** | **27.01** |
| Smelting plants: | | | | | | |
| 16. Haulage system (cars, motors, etc.) | 2 | 14.29 | 7.41 | 121 | 5.68 | 2.69 |
| 17. Railway cars and locomotives | ....... | ....... | ....... | 28 | 1.32 | .62 |
| 18. Cranes | ....... | ....... | ....... | 32 | 1.50 | .71 |
| 19. Other machinery | 2 | 14.29 | 7.41 | 96 | 4.51 | 2.14 |
| 20. Falls of persons | 2 | 14.29 | 7.41 | 146 | 6.86 | 3.25 |
| 21. Suffocation in ore bins | 2 | 14.29 | 7.41 | ....... | ....... | ....... |
| 22. Flying or falling objects (rocks, timbers, etc.) | 1 | 7.14 | 3.70 | 287 | 13.48 | 6.39 |
| 23. Gas (burns or asphyxiation) | ....... | ....... | ....... | 15 | .70 | .33 |
| 24. Scalding (steam or water) | 1 | 7.14 | 3.70 | 20 | .94 | .45 |
| 25. Electricity | ....... | ....... | ....... | 6 | .28 | .13 |
| 26. Hand tools, axes, bars, etc | ....... | ....... | ....... | 179 | 8.41 | 3.98 |
| 27. Nails, splinters, etc | ....... | ....... | ....... | 51 | 2.40 | 1.14 |
| 28. Burns from matte, slag, or molten metal (pouring or spilling) | 1 | 7.14 | 3.70 | 401 | 18.84 | 8.93 |
| 29. Hot-metal explosions | ....... | ....... | ....... | 55 | 2.58 | 1.22 |
| 30. Other causes | 3 | 21.42 | 11.11 | 692 | 32.50 | 15.40 |
| **Total** | **14** | **100.00** | **51.85** | **2,129** | **100.00** | **47.38** |
| Auxiliary works: | | | | | | |
| 31. Haulage system (cars, motors, etc.) | 1 | 11.11 | 3.70 | 44 | 3.82 | .98 |
| 32. Railway cars and locomotives | 2 | 22.22 | 7.41 | 34 | 2.95 | .76 |
| 33. Falls of persons | 1 | 11.11 | 3.70 | 125 | 10.86 | 2.78 |
| 34. Falling objects (rocks, timbers, etc.) | ....... | ....... | ....... | 174 | 15.12 | 3.87 |
| 35. Nails, splinters, etc | ....... | ....... | ....... | 70 | 6.08 | 1.56 |
| 36. Hand tools, axes, bars, etc | ....... | ....... | ....... | 140 | 12.16 | 3.12 |
| 37. Electricity | ....... | ....... | ....... | 13 | 1.13 | .29 |
| 38. Machinery | 1 | 11.11 | 3.70 | 90 | 7.82 | 2.00 |
| 39. Failure of ladders, scaffold, or other support | ....... | ....... | ....... | 10 | .87 | .22 |
| 40. Handling hot materials | ....... | ....... | ....... | 33 | 2.87 | .73 |
| 41. Other causes | 4 | 44.45 | 14.81 | 418 | 36.32 | 9.30 |
| **Total** | **9** | **100.00** | **33.33** | **1,151** | **100.00** | **25.61** |
| **Grand total** | **27** | ....... | **100.00** | **4,494** | ....... | **100.00** |

TABLE 6.—***Metallurgical plants:*** *Accidents during the year ended December 31, 1921.*

| States. | Ore-dressing plants.[1] | | | | | Smelting plants.[2] | | | | | Auxiliary works. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Killed. | Seriously injured. (Time lost, more than 14 days.) | | | Slightly injured. (Time lost, 1 to 14 days.) | Killed. | Seriously injured. (Time lost, more than 14 days.) | | | Slightly injured. (Time lost, 1 to 14 days.) | Killed. | Seriously injured. (Time lost, more than 14 days.) | | | Slightly injured. (Time lost, 1 to 14 days.) |
| | | Permanent total disability.[3] | Permanent partial disability.[4] | Others.[5] | | | Permanent total disability.[3] | Permanent partial disability.[4] | Others.[5] | | | Permanent total disability.[3] | Permanent partial disability.[4] | Others.[5] | |
| Alaska | 1 | | | 8 | 4 | | | | | | | | | | |
| Arizona | | | 2 | 21 | 70 | 2 | | | 51 | 101 | 1 | | 3 | 32 | 71 |
| Arkansas | | | | | | | | | 4 | 35 | | | | 1 | 2 |
| California | | | | 32 | 34 | | | | 22 | 11 | | | | 12 | 10 |
| Colorado | | | 1 | 23 | 55 | 1 | | 1 | 22 | 10 | | | 1 | 5 | 2 |
| Idaho | 1 | | | 13 | 13 | | | | | | | | | 3 | 4 |
| Illinois | | | | 1 | 4 | | | 1 | 39 | 137 | | | 1 | 20 | 65 |
| Kansas | 1 | | 1 | 7 | 53 | | | | | | | | | | |
| Michigan | | | | 16 | 27 | | | 1 | 35 | 36 | | | | 6 | 49 |
| Minnesota | | | 1 | 4 | 22 | | | | | | | | | | |
| Missouri | | | | 13 | 79 | | | | | | 1 | | | 24 | 156 |
| Montana | | | | 13 | 25 | 2 | | | 24 | 28 | 1 | | | 24 | 41 |
| Nevada | | | | 12 | 73 | | | | 5 | 25 | | | | 1 | 12 |
| New Jersey | | | | 1 | 26 | 1 | | 2 | 47 | 148 | 1 | | | 18 | 72 |
| New Mexico | | | | 2 | 7 | | | | | | 1 | | | | 12 |
| New York | | | | 17 | 96 | | | | | | | | | 8 | 86 |
| Oklahoma | | | 2 | 10 | 68 | | | | 24 | 83 | | | | 5 | 41 |
| Oregon | | | | | 1 | | | | | | | | | 2 | |
| Pennsylvania | | | | | | | | 1 | 79 | 318 | | | | 32 | 65 |
| South Dakota | | | | 6 | 24 | | | | | | | | | | |
| Tennessee | | | | 6 | 12 | | | | | | 4 | | | 22 | 116 |
| Texas | | | | | | | | | 4 | 14 | | | | 1 | 3 |
| Utah | 1 | | 3 | 33 | 74 | 2 | | 5 | 50 | 55 | | | 1 | 3 | 5 |
| Vermont | | | | 2 | 1 | | | | | | | | | | |
| Virginia | | | | 3 | 1 | | | | | | | | | 2 | 3 |
| Washington | | | | | 1 | | | | | | | | | | |
| West Virginia | | | | | | 2 | | 4 | 2 | 85 | | | | | |
| Wisconsin | | | | | 2 | | | | | | | | | | |
| Other States | | | 2 | 38 | 149 | 4 | | 3 | 102 | 515 | | | 2 | 13 | 94 |
| **Total** | 4 | | 12 | 281 | 921 | 14 | | 18 | 510 | 1,601 | 9 | | 8 | 234 | 909 |

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[1] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

[2] Smelters include blast, reverberatory, and roasting furnaces; converters; casting department, and refineries.

[3] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[4] Permanent partial disability: Loss of one foot, hand, leg, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[5] "Other serious accidents" in 1919 include 50 cases of permanent partial disability; in 1920, 72 cases of permanent partial disability and 1 case of permanent total disability; and in 1921, 18 cases of permanent partial disability and 2 cases of permanent total disability.

TABLE 7.—***Metallurgical plants:*** *Accidents during the year ended December 31, 1921.*

| | Killed. | Seriously injured. (Time lost, more than 14 days.) | | | Slightly injured. (Time lost, 1 to 14 days.) |
|---|---|---|---|---|---|
| | | Permanent total disability.[1] | Permanent partial disability.[2] | Others. | |
| Ore-dressing plants:[3] | | | | | |
| 1. Haulage (cars and motors) | 1 | ........ | 1 | 18 | **34** |
| 2. Railway cars or locomotives | ........ | ........ | 1 | 8 | **8** |
| 3. Crushers, rolls, or stamps | 1 | ........ | ........ | 22 | **48** |
| 4. Tables, jigs, etc | ........ | ........ | ........ | 2 | **15** |
| 5. Other machinery | 2 | ........ | 4 | 35 | **91** |
| 6. Falls of persons | ........ | ........ | 1 | 47 | **84** |
| 7. Suffocation in ore bins | ........ | ........ | ........ | ........ | **5** |
| 8. Falling objects (rocks, timbers, etc.) | ........ | ........ | ........ | 31 | **68** |
| 9. Cyanide or other poisoning | ........ | ........ | ........ | 2 | **2** |
| 10. Scalding (steam or water) | ........ | ........ | ........ | 1 | **21** |
| 11. Electricity | ........ | ........ | ........ | 8 | **16** |
| 12. Hand tools, axes, bars, etc | ........ | ........ | 3 | 21 | **84** |
| 13. Nails, splinters, etc | ........ | ........ | ........ | 8 | **56** |
| 14. Flying pieces of rock from sledging or crushing | ........ | ........ | 1 | 7 | **65** |
| 15. Other causes | ........ | ........ | 1 | 71 | **324** |
| **Total** | **4** | ........ | **12** | **281** | **921** |
| Smelting plants:[4] | | | | | |
| 16. Haulage (cars, motors, etc.) | 2 | ........ | 4 | 53 | **64** |
| 17. Railway cars or locomotives | ........ | ........ | ........ | 12 | **16** |
| 18. Cranes | ........ | ........ | 2 | 14 | **16** |
| 19. Other machinery | 2 | ........ | 4 | 30 | **62** |
| 20. Falls of persons | 2 | ........ | 2 | 48 | **96** |
| 21. Suffocation in ore bins | 2 | ........ | ........ | ........ | ........ |
| 22. Flying or falling objects (rocks, timbers, etc.) | 1 | ........ | ........ | 77 | **210** |
| 23. Gas (burns or asphyxiation) | ........ | ........ | ........ | 2 | **13** |
| 24. Scalding (steam or water) | 1 | ........ | 1 | 5 | **14** |
| 25. Electricity | ........ | ........ | ........ | 1 | **5** |
| 26. Hand tools, axes, bars, etc | ........ | ........ | 1 | 38 | **140** |
| 27. Nails, splinters, etc | ........ | ........ | ........ | 11 | **40** |
| 28. Burns from matte, slag, or molten metal (pouring or spilling) | 1 | ........ | 2 | 70 | **329** |
| 29. Hot-metal explosions | ........ | ........ | 2 | 19 | **34** |
| 30. Other causes | 3 | ........ | ........ | 130 | **562** |
| **Total** | **14** | ........ | **18** | **510** | **1,601** |
| Auxiliary works: | | | | | |
| 31. Haulage (cars and motors) | 1 | ........ | 1 | 17 | **26** |
| 32. Railway cars and locomotives | 2 | ........ | ........ | 14 | **20** |
| 33. Falls of persons | 1 | ........ | ........ | 37 | **88** |
| 34. Falling objects (rocks, timbers, etc.) | ........ | ........ | 1 | 39 | **134** |
| 35. Nails and splinters | ........ | ........ | ........ | 12 | **58** |
| 36. Hand tools, axes, bars, etc | ........ | ........ | 2 | 17 | **121** |
| 37. Electricity | ........ | ........ | ........ | 6 | **7** |
| 38. Machinery | 1 | ........ | 2 | 18 | **70** |
| 39. Failure of ladder, scaffold, or other support | ........ | ........ | ........ | 3 | **7** |
| 40. Handling hot materials | ........ | ........ | ........ | 8 | **25** |
| 41. Other causes | 4 | ........ | 2 | 63 | 353 |
| **Total** | **9** | ........ | **8** | **234** | **909** |
| **Grand total** | **27** | **0** | **38** | **1,025** | **3,431** |

Number of wives left widows, 15.
Number of children under 16 years of age left fatherless, 28.

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[1] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[2] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[3] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

[4] Smelters include blast, reverberatory, and roasting furnaces; converters; casting department; and refineries. (Iron blast furnaces not included.)

TABLE 8.—***Ore-dressing plants:*** *Fatalities and injuries, by causes and States, 1914 to 1921.*

| | Killed. | | | | | | | | Injured. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| ACCIDENTS BY CAUSES. | | | | | | | | | | | | | | | | |
| 1. Haulage system (cars, motors, etc) | .... | 3 | 3 | 7 | 4 | .... | 1 | 1 | 79 | 106 | 146 | 135 | 107 | 111 | 127 | 53 |
| 2. Railway cars and locomotives | 3 | 2 | 4 | 4 | 1 | 2 | .... | .... | 38 | 17 | 42 | 29 | 68 | 48 | 24 | 17 |
| 3. Crushers, rolls, or stamps | 2 | 5 | .... | 3 | .... | 1 | 2 | 1 | 64 | 129 | 168 | 112 | 111 | 108 | 102 | 70 |
| 4. Tables, jigs, etc | .... | .... | .... | 2 | .... | 1 | .... | .... | 46 | 59 | 82 | 61 | 92 | 59 | 42 | 17 |
| 5. Other machinery | 6 | 7 | 11 | 9 | 14 | 6 | 8 | 2 | 170 | 299 | 336 | 282 | 368 | 284 | 288 | 130 |
| 6. Falls of persons | 3 | 6 | 2 | 9 | 6 | 4 | 2 | .... | 205 | 249 | 373 | 399 | 414 | 201 | 323 | 132 |
| 7. Suffocation in ore bins | 2 | 3 | 3 | 3 | 2 | 4 | 4 | .... | 2 | 3 | 4 | 6 | 11 | 5 | 4 | 5 |
| 8. Falling objects (rocks, timbers, etc.) | 3 | .... | 1 | 4 | .... | 1 | .... | .... | 222 | 192 | 363 | 371 | 389 | 200 | 283 | 99 |
| 9. Cyanide or other poisoning | .... | .... | .... | .... | 1 | 1 | .... | .... | 9 | 23 | 13 | 24 | 45 | 11 | 16 | 4 |
| 10. Scalding (steam or water) | .... | .... | 2 | 1 | .... | 1 | .... | .... | 9 | 12 | 35 | 18 | 15 | 34 | 22 | 22 |
| 11. Electricity | 2 | 3 | 2 | 4 | 3 | 2 | 2 | .... | 30 | 38 | 53 | 40 | 63 | 23 | 36 | 24 |
| 12. Hand tools, axes, bars, etc | .... | .... | 1 | .... | .... | .... | .... | .... | 133 | 235 | 360 | 249 | 298 | 167 | 261 | 108 |
| 13. Nails, splinters, etc | .... | .... | .... | .... | .... | .... | .... | .... | 78 | 131 | 171 | 193 | 165 | 97 | 120 | 64 |
| 14. Flying pieces of rock from sledging or crushing | .... | .... | .... | .... | .... | .... | .... | .... | 50 | 76 | 109 | 302 | 198 | 140 | 179 | 73 |
| 15. Other causes | 2 | 1 | 4 | 1 | 4 | 2 | 2 | .... | 299 | 526 | 929 | 731 | 798 | 569 | 797 | 396 |
| **Total** | **23** | **30** | **33** | **47** | **35** | **25** | **21** | **4** | **1,434** | **2,095** | **3,184** | **2,952** | **3,142** | **2,057** | **2,624** | **1,214** |
| ACCIDENTS BY STATES. | | | | | | | | | | | | | | | | |
| Alabama | .... | 1 | .... | 1 | .... | 1 | 1 | .... | 1 | 6 | 9 | 7 | 25 | 12 | 9 | ..... |
| Alaska | 1 | .... | .... | 3 | .... | 3 | 1 | 1 | 30 | 73 | 127 | 141 | 54 | 25 | 49 | 12 |
| Arizona | 5 | 1 | 3 | 6 | 6 | 2 | 1 | .... | 287 | 350 | 524 | 578 | 653 | 448 | 314 | 93 |
| Arkansas | .... | .... | .... | .... | 1 | .... | .... | .... | ..... | 2 | 20 | 11 | 6 | ..... | 29 | ..... |
| California | 1 | 2 | .... | .... | 3 | 1 | 3 | .... | 111 | 91 | 118 | 30 | 105 | 43 | 114 | 66 |
| Colorado | 2 | 7 | 4 | 7 | 2 | 2 | 3 | .... | 103 | 153 | 176 | 214 | 170 | 64 | 120 | 79 |
| Idaho | 1 | 1 | .... | .... | .... | .... | 1 | 1 | 19 | 55 | 75 | 62 | 62 | 27 | 51 | 26 |
| Illinois | .... | .... | .... | .... | .... | .... | 1 | .... | 3 | 3 | 4 | 9 | 26 | 24 | 16 | 5 |
| Kansas | .... | .... | .... | .... | .... | .... | .... | 1 | ..... | 2 | 7 | 15 | 31 | 22 | 42 | 61 |
| Michigan | 1 | .... | 2 | 2 | 2 | 2 | 1 | .... | 51 | 112 | 137 | 88 | 88 | 102 | 144 | 43 |
| Minnesota | .... | .... | .... | .... | .... | 1 | .... | .... | ..... | 22 | 48 | 40 | 18 | 34 | 19 | 27 |
| Missouri | 2 | 2 | 1 | 2 | 1 | .... | 2 | .... | 180 | 155 | 186 | 175 | 249 | 152 | 130 | 92 |
| Montana | 4 | 5 | 3 | 6 | 4 | .... | 1 | .... | 121 | 292 | 168 | 148 | 168 | 82 | 104 | 38 |
| Nevada | 2 | 4 | 1 | 4 | 6 | 4 | 2 | .... | 83 | 147 | 133 | 117 | 142 | 51 | 181 | 85 |
| New Jersey | .... | 1 | 3 | 2 | .... | 1 | .... | .... | 27 | 26 | 45 | 57 | 60 | 40 | 26 | 27 |
| New Mexico | .... | 2 | 4 | 1 | 1 | 1 | 2 | .... | 95 | 131 | 310 | 183 | 229 | 115 | 79 | 9 |
| New York | .... | 1 | 4 | 1 | 2 | 3 | .... | .... | 12 | 38 | 73 | 77 | 56 | 206 | 158 | 113 |
| Oklahoma | .... | .... | .... | 2 | 1 | 3 | .... | .... | 35 | 3 | 15 | 208 | 212 | 213 | 335 | 80 |
| Oregon | .... | .... | .... | .... | 1 | .... | .... | .... | 5 | 11 | 2 | 6 | 2 | 7 | 22 | 1 |
| Pennsylvania | .... | .... | .... | .... | .... | .... | .... | .... | ..... | ..... | 1 | 1 | 1 | 2 | 24 | ..... |
| South Dakota | .... | .... | .... | .... | .... | .... | .... | .... | 10 | 33 | 51 | 23 | 32 | 17 | 20 | 30 |
| Tennessee | .... | .... | 1 | 1 | 1 | .... | .... | .... | 1 | 27 | 48 | 40 | 17 | 26 | 40 | 18 |
| Texas | .... | .... | .... | .... | .... | .... | .... | .... | 7 | ..... | 7 | 6 | 2 | ..... | ..... | ..... |
| Utah | 4 | 2 | 5 | 5 | 2 | 1 | 1 | 1 | 211 | 263 | 711 | 496 | 525 | 205 | 276 | 110 |
| Vermont | .... | .... | .... | .... | .... | .... | .... | .... | ..... | 3 | 8 | 13 | 22 | 1 | 15 | 3 |
| Virginia | .... | 1 | 1 | .... | 1 | .... | .... | .... | 5 | 35 | 43 | 16 | 30 | 38 | 16 | 4 |
| Washington | .... | .... | .... | .... | .... | .... | .... | .... | ..... | ..... | ..... | 8 | 26 | 2 | 5 | 1 |
| Wisconsin | .... | .... | .... | 3 | 1 | .... | .... | .... | 16 | 51 | 90 | 150 | 55 | 40 | 54 | 2 |
| Other States | .... | .... | 1 | 1 | .... | .... | 1 | .... | 21 | 11 | 48 | 33 | 76 | 59 | 232 | 189 |
| **Total** | **23** | **30** | **33** | **47** | **35** | **25** | **21** | **4** | **1,434** | **2,095** | **3,184** | **2,952** | **3,142** | **2,057** | **2,624** | **1,214** |

**Table 9.**—***Smelting plants:*** *Fatalities and injuries, by causes and States, 1914 to 1921.*

| | Killed. | | | | | | | | Injured. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| ACCIDENTS BY CAUSES. | | | | | | | | | | | | | | | | |
| 16. Haulage system (cars, motors, etc.) | 3 | 10 | 4 | 7 | 8 | 6 | 4 | 2 | 495 | 529 | 814 | 693 | 559 | 350 | 238 | **121** |
| 17. Railway cars and locomotives | 7 | 2 | 2 | 4 | 5 | .... | .... | .... | 111 | 61 | 117 | 113 | 87 | 46 | 72 | **28** |
| 18. Cranes | .... | 2 | 5 | 3 | 2 | 6 | .... | .... | 55 | 58 | 130 | 146 | 97 | 60 | 51 | **32** |
| 19. Other machinery | 3 | 5 | 3 | 9 | 13 | 4 | 5 | 2 | 250 | 290 | 385 | 375 | 377 | 217 | 185 | **96** |
| 20. Falls of persons | 6 | 3 | 9 | 8 | 4 | 4 | 3 | 2 | 620 | 499 | 757 | 564 | 496 | 330 | 295 | **146** |
| 21. Suffocation in ore bins | 2 | 1 | 1 | 1 | .... | 1 | .... | 2 | 1 | 8 | 1 | 73 | 5 | 2 | 4 | .... |
| 22. Flying or falling objects (rocks, timbers, etc.) | 1 | 1 | 4 | 2 | .... | 2 | 3 | 1 | 1,052 | 914 | 1,438 | 1,107 | 1,050 | 734 | 609 | **287** |
| 23. Gas (burns or asphyxiation) | .... | 3 | 1 | .... | .... | 1 | .... | .... | 59 | 68 | 112 | 48 | 136 | 60 | 40 | **15** |
| 24. Scalding (steam or water) | 1 | 2 | 1 | 2 | .... | .... | 1 | 1 | 62 | 46 | 132 | 76 | 68 | 39 | 47 | **20** |
| 25. Electricity | 2 | 4 | 1 | 9 | 3 | 2 | 1 | .... | 49 | 46 | 36 | 37 | 41 | 31 | 23 | **6** |
| 26. Hand tools, axes, bars, etc | .... | .... | .... | .... | .... | .... | .... | .... | 586 | 633 | 875 | 736 | 562 | 337 | 414 | **179** |
| 27. Nails, splinters, etc | .... | .... | .... | .... | .... | .... | .... | .... | 96 | 146 | 252 | 208 | 163 | 70 | 87 | **51** |
| 28. Burns from matte, slag, or molten metal (pouring or spilling) | 2 | 3 | 1 | 2 | 4 | 2 | .... | 1 | 959 | 894 | 2,163 | 1,488 | 1,290 | 959 | 897 | **401** |
| 29. Hot-metal explosions | .... | 1 | 3 | 2 | 2 | 2 | 1 | .... | 162 | 160 | 217 | 242 | 255 | 95 | 62 | **55** |
| 30. Other causes | 6 | 1 | 1 | 4 | 1 | 4 | 2 | 3 | 1,116 | 1,366 | 2,227 | 1,839 | 1,557 | 1,101 | 1,123 | **692** |
| **Total** | 33 | 38 | 36 | 53 | 42 | 34 | 20 | 14 | 5,673 | 5,718 | 9,656 | 7,745 | 6,743 | 4,431 | 4,147 | **2,129** |
| ACCIDENTS BY STATES. | | | | | | | | | | | | | | | | |
| **Arizona** | 3 | 7 | 1 | 10 | 9 | 5 | 3 | 2 | 553 | 574 | 1,112 | 1,184 | 1,412 | 716 | 687 | **152** |
| **Arkansas** | .... | .... | .... | .... | 2 | .... | 1 | .... | .... | .... | 154 | 83 | 53 | 65 | 84 | **39** |
| **California** | 1 | .... | 1 | 5 | .... | 1 | .... | .... | 163 | 163 | 224 | 188 | 289 | 122 | 37 | **33** |
| **Colorado** | 2 | 6 | 1 | 1 | 5 | 1 | 2 | 1 | 636 | 404 | 508 | 331 | 269 | 172 | 165 | **33** |
| **Illinois** | 3 | 2 | 2 | 3 | 3 | .... | 3 | .... | 697 | 782 | 1,356 | 749 | 636 | 408 | 433 | **177** |
| **Kansas** | .... | 1 | 3 | 1 | 2 | 1 | .... | .... | 89 | 408 | 695 | 283 | 125 | 157 | 141 | .... |
| **Maryland** | .... | .... | 1 | 2 | 1 | .... | .... | .... | .... | .... | 605 | 359 | 131 | .... | .... | .... |
| **Michigan** | .... | .... | 1 | .... | .... | 1 | .... | .... | .... | .... | 251 | 164 | 104 | 52 | 107 | **72** |
| **Missouri** | .... | 3 | 2 | 2 | .... | .... | .... | .... | 257 | 304 | 317 | 437 | 482 | 271 | 427 | .... |
| **Montana** | 6 | 6 | 3 | .... | 2 | 7 | 2 | 2 | 538 | 457 | 333 | 238 | 248 | 141 | 151 | **52** |
| **Nevada** | 1 | .... | .... | 3 | 2 | 1 | .... | .... | 33 | 58 | 90 | 132 | 117 | 28 | 132 | **30** |
| **New Jersey** | 3 | 4 | 6 | 5 | 4 | 4 | .... | 1 | 622 | 630 | 646 | 677 | 682 | 414 | 377 | **197** |
| **New Mexico** | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 10 | .... | .... | .... | .... |
| **New York** | 1 | .... | 1 | .... | .... | .... | .... | .... | 49 | .... | 361 | .... | .... | 4 | .... | .... |
| **Oklahoma** | 1 | 1 | 1 | 4 | 4 | .... | .... | .... | 97 | 262 | 817 | 895 | 479 | 544 | 265 | **107** |
| **Oregon** | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| **Pennsylvania** | 1 | 2 | 3 | 3 | 2 | .... | .... | .... | 205 | 339 | 610 | 608 | 396 | 382 | 374 | **398** |
| **South Dakota** | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... |
| **Tennessee** | 1 | 1 | 1 | .... | .... | 1 | .... | .... | 326 | 249 | 241 | .... | .... | 130 | .... | .... |
| **Texas** | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | 179 | 164 | 178 | 99 | 39 | **18** |
| **Utah** | 5 | 3 | 8 | 9 | 4 | 4 | 3 | 2 | 605 | 437 | 622 | 556 | 383 | 265 | 163 | **110** |
| **Vermont** | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | .... | .... | .... | .... | .... |
| **Virginia** | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 39 | .... | .... | 2 | .... | .... |
| **Washington** | .... | .... | 1 | .... | .... | 1 | .... | .... | .... | .... | 135 | .... | .... | 71 | 77 | .... |
| **West Virginia** | .... | 1 | .... | 1 | .... | .... | .... | 2 | 61 | 106 | 148 | 182 | 107 | 83 | 91 | **91** |
| **Wisconsin** | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 36 | .... | 15 | 26 | .... |
| **Other States** | 5 | 1 | .... | 4 | 1 | 7 | 6 | 4 | 742 | 545 | 209 | 469 | 652 | 290 | 371 | **620** |
| **Total** | 33 | 38 | 36 | 53 | 42 | 34 | 20 | 14 | 5,673 | 5,718 | 9,656 | 7,745 | 6,743 | 4,431 | 4,147 | **2,129** |

TABLE 10.—***Metallurgical plants:*** *Injuries and number injured per 1,000 300-day workers employed, by causes, 1914 to 1921.*

| Cause of accident. | Number injured. | | | | | | | | Number injured per 1,000 300-day workers. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| Ore-dressing plants: | | | | | | | | | | | | | | | | |
| 1. Haulage system (cars, motors, etc.) | 79 | 106 | 146 | 135 | 107 | 111 | 127 | 53 | 5.19 | 5.55 | 6.22 | 5.54 | 4.75 | 6.60 | 7.55 | 6.59 |
| 2. Railway cars and locomotives | 38 | 17 | 42 | 29 | 68 | 48 | 24 | 17 | 2.50 | .89 | 1.79 | 1.19 | 3.02 | 2.85 | 1.43 | 2.12 |
| 3. Crushers, rolls, or stamps | 64 | 129 | 168 | 112 | 111 | 108 | 102 | 70 | 4.20 | 6.75 | 7.16 | 4.60 | 4.93 | 6.42 | 6.07 | 8.71 |
| 4. Tables, jigs, etc. | 46 | 59 | 82 | 61 | 92 | 59 | 42 | 17 | 3.02 | 3.09 | 3.49 | 2.50 | 4.08 | 3.51 | 2.50 | 21.2 |
| 5. Other machinery | 170 | 299 | 336 | 282 | 368 | 284 | 288 | 130 | 11.17 | 15.65 | 14.32 | 11.57 | 16.34 | 16.87 | 17.13 | 16.17 |
| 6. Falls of persons | 205 | 249 | 373 | 399 | 414 | 201 | 323 | 132 | 13.47 | 13.03 | 15.89 | 16.37 | 18.39 | 11.94 | 19.21 | 16.42 |
| 7. Suffocation in ore bins | 2 | 3 | 4 | 6 | 11 | 5 | 4 | 5 | .13 | .16 | .17 | .25 | .49 | .30 | .24 | .62 |
| 8. Falling objects (rocks, timbers, etc.) | 222 | 192 | 363 | 371 | 389 | 200 | 283 | 99 | 14.58 | 10.05 | 15.47 | 15.22 | 17.28 | 11.87 | 16.83 | 12.32 |
| 9. Cyanide or other poisoning | 9 | 23 | 13 | 24 | 45 | 11 | 16 | 4 | .59 | 1.20 | .55 | .98 | 2.00 | .65 | .95 | .50 |
| 10. Scalding (steam or water) | 9 | 12 | 35 | 18 | 15 | 34 | 22 | 22 | .59 | .63 | 1.49 | .74 | .67 | 2.02 | 1.31 | 2.74 |
| 11. Electricity | 30 | 38 | 53 | 40 | 63 | 23 | 36 | 24 | 1.97 | 1.99 | 2.26 | 1.64 | 2.80 | 1.37 | 2.14 | 2.99 |
| 12. Hand tools, axes, bars, etc.) | 133 | 235 | 360 | 249 | 298 | 167 | 261 | 108 | 8.74 | 12.30 | 15.34 | 10.22 | 13.23 | 9.92 | 15.52 | 13.44 |
| 13. Nails, splinters, etc | 78 | 131 | 171 | 193 | 165 | 97 | 120 | 64 | 5.12 | 6.85 | 7.29 | 7.92 | 7.33 | 5.76 | 7.14 | 7.96 |
| 14. Flying pieces of rock from sledging or crushing | 50 | 76 | 109 | 302 | 198 | 140 | 179 | 73 | 3.28 | 3.98 | 4.64 | 12.39 | 8.79 | 8.32 | 10.65 | 9.08 |
| 15. Other causes | 299 | 526 | 929 | 731 | 798 | 569 | 797 | 396 | 19.64 | 27.53 | 39.58 | 29.99 | 35.44 | 33.81 | 47.40 | 49.27 |
| **Total** | **1,434** | **2,095** | **3,184** | **2,952** | **3,142** | **2,057** | **2,624** | **1,214** | **94.19** | **109.65** | **135.66** | **121.12** | **139.54** | **122.21** | **156.07** | **151.05** |
| **Number of 300-day workers** | **15,225** | **19,107** | **23,470** | **24,372** | **22,517** | **16,832** | **16,813** | **8,037** | | | | | | | | |
| Smelting plants: | | | | | | | | | | | | | | | | |
| 16. Haulage system (cars, motors, etc.) | 495 | 529 | 814 | 693 | 559 | 350 | 238 | 121 | 15.31 | 14.59 | 16.49 | 13.68 | 12.30 | 11.17 | 7.83 | 6.33 |
| 17. Railway cars and locomotives | 111 | 61 | 117 | 113 | 87 | 46 | 72 | 28 | 3.43 | 1.68 | 2.37 | 2.23 | 1.91 | 1.47 | 2.38 | 1.46 |
| 18. Cranes | 55 | 58 | 130 | 146 | 97 | 60 | 51 | 32 | 1.70 | 1.60 | 2.63 | 2.88 | 2.13 | 1.92 | 1.68 | 1.67 |
| 19. Other machinery | 250 | 290 | 385 | 375 | 377 | 217 | 185 | 96 | 7.73 | 8.00 | 7.80 | 7.40 | 8.30 | 6.93 | 6.08 | 5.02 |
| 20. Falls of persons | 620 | 499 | 757 | 564 | 496 | 330 | 295 | 146 | 19.17 | 13.76 | 15.34 | 11.13 | 10.92 | 10.54 | 9.70 | 7.64 |
| 21. Suffocation in ore bins | 1 | 8 | 1 | 73 | 5 | 2 | 4 | | .03 | .22 | .02 | 1.44 | .11 | .06 | .13 | |
| 22. Flying or falling objects (rocks, timbers, etc.) | 1,052 | 914 | 1,438 | 1,107 | 1,050 | 734 | 609 | 287 | 32.53 | 25.21 | 29.13 | 21.85 | 23.11 | 23.43 | 20.03 | 15.02 |
| 23. Gas (burns or asphyxiation) | 59 | 68 | 112 | 48 | 136 | 60 | 40 | 15 | 1.83 | 1.87 | 2.27 | .95 | 2.99 | 1.92 | 1.32 | .78 |
| 24. Scalding (steam or water) | 62 | 46 | 132 | 76 | 68 | 39 | 47 | 20 | 1.92 | 1.27 | 2.67 | 1.50 | 1.50 | 1.25 | 1.55 | 1.05 |
| 25. Electricity | 49 | 46 | 36 | 37 | 41 | 31 | 23 | 6 | 1.52 | 1.27 | .73 | .73 | .90 | .99 | .76 | .31 |
| 26. Hand tools, axes, bars, etc | 586 | 633 | 875 | 736 | 562 | 337 | 414 | 179 | 18.12 | 17.46 | 17.73 | 14.53 | 12.37 | 10.76 | 13.61 | 9.37 |
| 27. Nails, splinters, etc | 96 | 146 | 252 | 208 | 163 | 70 | 87 | 51 | 2.97 | 4.03 | 5.10 | 4.11 | 3.59 | 2.23 | 2.86 | 2.67 |
| 28. Burns from matte, slag, or molten metal (pouring or spilling) | 959 | 894 | 2,163 | 1,488 | 1,290 | 959 | 897 | 401 | 29.66 | 24.65 | 43.82 | 29.37 | 28.39 | 30.61 | 29.50 | 20.98 |
| 29. Hot-metal explosions | 162 | 160 | 217 | 242 | 255 | 95 | 62 | 55 | 5.01 | 4.41 | 4.40 | 4.78 | 5.61 | 3.03 | 2.04 | 2.88 |
| 30. Other causes | 1,116 | 1,366 | 2,227 | 1,839 | 1,557 | 1,101 | 1,123 | 692 | 34.51 | 37.67 | 45.11 | 36.30 | 34.27 | 35.15 | 36.93 | 36.21 |
| **Total** | **5,673** | **5,718** | **9,656** | **7,745** | **6,743** | **4,431** | **4,147** | **2,129** | **175.44** | **157.69** | **195.61** | **152.88** | **148.40** | **141.46** | **136.37** | **111.39** |
| **Number of 300-day workers** | **32,336** | **36,262** | **49,363** | **50,659** | **45,439** | **31,324** | **30,411** | **19,113** | | | | | | | | |

TABLE 11.– ***Metallurgical plants:*** *Men employed and the equivalent in 300-day workers, by States, 1914 to 1921.*

ACTUAL NUMBER EMPLOYED.

| State. | Ore-dressing plants. | | | | | | | | Smelting plants. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| Alabama | 100 | 57 | 92 | 193 | 315 | 203 | 194 | 45 | .... | .... | .... | .... | .... | .... | .... | .... |
| Alaska | 225 | 520 | 925 | 467 | 336 | 375 | 459 | 580 | .... | .... | .... | .... | .... | .... | .... | .... |
| Arizona | 1,314 | 1,776 | 2,380 | 2,630 | 3,319 | 2,149 | 1,812 | 773 | 2,491 | 2,813 | 3,470 | 4,398 | 4,477 | 1,678 | 2,593 | 1,628 |
| Arkansas | (1) | 89 | 173 | 163 | 74 | 29 | 143 | (1) | .... | .... | 410 | 530 | 465 | 712 | 440 | 270 |
| California | 581 | 766 | 794 | 755 | 1,229 | 633 | 508 | 378 | 917 | 1,050 | 1,146 | 590 | 639 | 464 | 333 | 313 |
| Colorado | 960 | 1,219 | 1,382 | 1,715 | 1,885 | 1,347 | 1,027 | 670 | 2,810 | 2,327 | 3,099 | 2,864 | 2,671 | 1,438 | 1,371 | 513 |
| Georgia | (1) | 57 | 68 | 82 | (1) | 21 | (1) | (1) | .... | .... | .... | .... | .... | .... | (1) | (1) |
| Idaho | 441 | 470 | 611 | 642 | 452 | 494 | 512 | 367 | .... | .... | .... | (1) | (1) | (1) | (1) | (1) |
| Illinois | 164 | (1) | 58 | 156 | 151 | 120 | 121 | 80 | 3,228 | 3,467 | 4,735 | 3,731 | 3,711 | 2,582 | 2,433 | 950 |
| Kansas | (1) | 114 | 80 | 206 | 147 | 194 | 209 | 137 | 942 | 2,584 | 3,611 | 2,148 | 848 | 791 | 852 | (1) |
| Maryland | .... | (1) | 9 | 26 | .... | (1) | .... | .... | | .... | 1,300 | 3,414 | 2,628 | (1) | (1) | .... |
| Michigan | 1,761 | 2,354 | 2,255 | 2,426 | 1,948 | 1,795 | 1,418 | 918 | (1) | 724 | 1,001 | 1,197 | 994 | 764 | 585 | 468 |
| Minnesota | (1) | 241 | 286 | 337 | 561 | 522 | 556 | 276 | .... | .... | .... | .... | .... | .... | .... | .... |
| Missouri | 1,466 | 1,462 | 1,375 | 1,523 | 1,074 | 878 | 795 | 628 | 980 | 1,155 | 1,532 | 1,560 | 1,226 | 1,000 | 1,053 | (1) |
| Montana | 1,709 | 2,451 | 2,153 | 2,051 | 2,360 | 1,096 | 1,122 | 509 | 2,508 | 3,344 | 3,200 | 2,399 | 2,452 | 1,350 | 1,214 | 648 |
| Nevada | 1,396 | 1,401 | 1,556 | 1,565 | 1,450 | 903 | 889 | 494 | 726 | 722 | 870 | 1,143 | 1,297 | 836 | 672 | 213 |
| New Jersey | 440 | 562 | 715 | 537 | 671 | 605 | 511 | 441 | 3,567 | 4,116 | 4,870 | 4,313 | 4,133 | 3,002 | 2,650 | 1,742 |
| Mew Mexico | 741 | 762 | 1,346 | 891 | 773 | 587 | 558 | 267 | .... | (1) | 48 | 152 | (1) | (1) | (1) | (1) |
| New York | 145 | 370 | 567 | 565 | 435 | 793 | 911 | 619 | 210 | .... | 570 | (1) | (1) | 233 | (1) | (1) |
| North Carolina | (1) | 94 | 55 | 46 | 46 | 43 | (1) | .... | .... | .... | .... | .... | .... | .... | (1) | .... |
| Oklahoma | 404 | 113 | 94 | 452 | 471 | 1,071 | 1,034 | 353 | 1,210 | 1,679 | 5,181 | 5,063 | 3,064 | 2,161 | 1,859 | 985 |
| Oregon | 142 | 69 | 77 | 97 | 67 | 95 | 48 | 28 | .... | (1) | 22 | (1) | (1) | (1) | .... | (1) |
| Pennsylvania | .... | (1) | 25 | 24 | 56 | 52 | 90 | (1) | 1,279 | 2,015 | 2,583 | 3,700 | 3,803 | 3,138 | 2,955 | 1,659 |
| South Dakota | 358 | 395 | 362 | 250 | 304 | 288 | 248 | 241 | .... | .... | 16 | .... | .... | .... | .... | .... |
| Tennessee | 87 | 328 | 460 | 425 | 266 | 206 | 366 | 197 | 299 | (1) | 200 | (1) | (1) | 204 | (1) | (1) |
| Texas | 57 | .... | 60 | 100 | 72 | (1) | (1) | (1) | (1) | 919 | 963 | 1,100 | 1,116 | 492 | 674 | 4,509 |
| Utah | 2,054 | 1,664 | 3,017 | 4,103 | 1,942 | 1,382 | 1,064 | 738 | 2,779 | 2,198 | 2,401 | 2,658 | 3,173 | 1,832 | 1,775 | 1,272 |
| Vermont | .... | 131 | 137 | 215 | 193 | 66 | 134 | 48 | .... | .... | 8 | .... | .... | .... | .... | .... |
| Virginia | 100 | 488 | 475 | 709 | 550 | 648 | 599 | 112 | (1) | (1) | 251 | (1) | (1) | 231 | (1) | (1) |
| Washington | 18 | (1) | 17 | 63 | 147 | 79 | 177 | 26 | (1) | 865 | 1,045 | (1) | (1) | 1,449 | 776 | (1) |
| West Virginia | .... | .... | .... | .... | .... | .... | .... | .... | 826 | 834 | 932 | 1,090 | 712 | 610 | 640 | 358 |
| Wisconsin | 175 | 254 | 421 | 247 | 195 | 219 | 166 | 69 | (1) | (1) | 5 | 113 | (1) | 85 | 151 | (1) |
| Other States | 290 | 357 | 340 | 450 | 320 | 369 | 1,156 | 1,053 | 3,107 | 515 | 360 | 2,213 | 2,490 | 3,725 | 3,073 | 3,128 |
| **Total** | **15,128** | **18,564** | **22,365** | **24,111** | **21,809** | **17,262** | **16,827** | **10,047** | **27,879** | **31,327** | **43,829** | **44,376** | **39,899** | **28,777** | **26,099** | **18,656** |

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[1] Included in "Other States."

TABLE 11.—***Metallurgical plants:*** *Men employed and the equivalent in 300-day workers, by States, 1914 to 1921*—Continued.

EQUIVALENT IN 300-DAY WORKERS (CALCULATED).

| State. | Ore-dressing plants. | | | | | | | | Smelting plants. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| Alabama | 58 | 19 | 55 | 149 | 191 | 101 | 127 | 12 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Alaska | 253 | 530 | 1,111 | 467 | 373 | 445 | 557 | 586 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Arizona | 1,457 | 1,839 | 2,637 | 2,679 | 3,730 | 2,420 | 2,083 | 524 | 2,919 | 3,034 | 4,034 | 5,068 | 5,425 | 1,869 | 3,158 | 617 |
| Arkansas | ........ | 75 | 142 | 128 | 57 | 25 | 125 | ........ | ........ | ........ | 251 | 609 | 543 | 813 | 490 | 193 |
| California | 512 | 812 | 780 | 906 | 1,475 | 518 | 454 | 345 | 1,047 | 1,239 | 1,274 | 708 | 766 | 384 | 364 | 330 |
| Colorado | 975 | 1,219 | 1,382 | 1,715 | 1,885 | 1,207 | 1,060 | 634 | 3,356 | 2,799 | 3,098 | 2,864 | 2,671 | 1,749 | 1,517 | 524 |
| Georgia | ........ | 48 | 65 | 83 | ........ | 13 | (1) | ........ | ........ | ........ | ........ | ........ | ........ | ........ | (1) | ........ |
| Idaho | 388 | 438 | 629 | 597 | 451 | 406 | 536 | 317 | ........ | ........ | ........ | ........ | ........ | (1) | (1) | ........ |
| Illinois | 121 | ........ | 36 | 143 | 153 | 111 | 107 | 67 | 3,892 | 4,159 | 5,434 | 4,398 | 4,471 | 2,775 | 2,939 | 1,027 |
| Kansas | ........ | 85 | 79 | 107 | 103 | 169 | 158 | 121 | 1,126 | 2,454 | 4,083 | 2,077 | 566 | 938 | 1,015 | ........ |
| Maryland | ........ | ........ | 5 | 18 | ........ | (1) | (1) | ........ | ........ | ........ | 1,522 | 3,726 | 2,849 | (1) | (1) | ........ |
| Michigan | 1,646 | 2,406 | 2,346 | 2,510 | 1,987 | 1,879 | 1,428 | 749 | ........ | 748 | 1,089 | 1,238 | 1,023 | 862 | 589 | 277 |
| Minnesota | ........ | 161 | 239 | 269 | 315 | 277 | 292 | 139 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Missouri | 1,339 | 1,316 | 1,332 | 1,307 | 981 | 740 | 841 | 620 | 1,177 | 1,336 | 1,806 | 1,898 | 1,114 | 892 | 1,172 | ........ |
| Montana | 1,725 | 2,655 | 2,152 | 2,019 | 2,490 | 1,197 | 1,241 | 328 | 2,642 | 4,002 | 3,265 | 2,507 | 2,550 | 1,558 | 1,418 | 554 |
| Nevada | 1,525 | 1,541 | 1,713 | 1,621 | 1,739 | 1,084 | 997 | 407 | 843 | 866 | 1,018 | 1,378 | 1,557 | 1,005 | 780 | 104 |
| New Jersey | 451 | 607 | 804 | 551 | 679 | 597 | 511 | 370 | 4,048 | 4,958 | 5,929 | 5,123 | 5,013 | 2,746 | 3,193 | 2,119 |
| New Mexico | 786 | 878 | 1,547 | 969 | 841 | 617 | 519 | 99 | ........ | ........ | 55 | 76 | ........ | (1) | ........ | ........ |
| New York | 104 | 348 | 509 | 522 | 357 | 749 | 886 | 506 | 215 | ........ | 514 | ........ | ........ | 208 | ........ | ........ |
| North Carolina | ........ | 61 | 51 | 38 | 45 | 34 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Oklahoma | 394 | 88 | 71 | 346 | 385 | 959 | 984 | 192 | 1,414 | 2,043 | 5,487 | 6,093 | 3,315 | 2,451 | 1,918 | 785 |
| Oregon | 113 | 56 | 40 | 79 | 70 | 66 | 48 | 4 | ........ | ........ | 25 | ........ | ........ | (1) | ........ | ........ |
| Pennsylvania | ........ | ........ | 26 | 17 | 43 | 45 | 101 | ........ | 1,509 | 2,205 | 3,106 | 4,442 | 4,609 | 3,606 | 3,562 | 1,946 |
| South Dakota | 431 | 461 | 387 | 292 | 321 | 307 | 300 | 291 | ........ | ........ | 8 | ........ | ........ | ........ | ........ | ........ |
| Tennessee | 90 | 264 | 401 | 382 | 222 | 165 | 365 | 111 | 351 | ........ | 234 | ........ | ........ | 225 | ........ | ........ |
| Texas | 62 | ........ | 58 | 98 | 61 | (1) | ........ | ........ | ........ | 1,118 | 1,172 | 1,336 | 1,352 | 583 | 818 | 5,472 |
| Utah | 2,398 | 2,005 | 3,579 | 4,865 | 2,304 | 1,613 | 1,216 | 612 | 3,377 | 2,674 | 2,928 | 3,176 | 3,861 | 2,225 | 2,137 | 1,369 |
| Vermont | ........ | 123 | 140 | 194 | 191 | 55 | 132 | 37 | ........ | ........ | 2 | ........ | ........ | ........ | ........ | ........ |
| Virginia | 81 | 511 | 453 | 690 | 518 | 529 | 522 | 57 | ........ | ........ | 290 | ........ | ........ | 166 | ........ | ........ |
| Washington | 12 | ........ | 14 | 39 | 126 | 64 | 115 | 13 | ........ | 1,052 | 1,171 | ........ | ........ | 1,598 | 944 | ........ |
| West Virginia | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | 980 | 1,014 | 1,130 | 1,269 | 845 | 631 | 669 | 384 |
| Wisconsin | 132 | 268 | 376 | 213 | 196 | 194 | 151 | 30 | ........ | ........ | 5 | 124 | ........ | 100 | 182 | ........ |
| Other States | 172 | 293 | 311 | 359 | 228 | 276 | 957 | 866 | 3,440 | 561 | 433 | 2,549 | 2,909 | 3,940 | 3,546 | 3,412 |
| **Total** | **15,225** | **19,107** | **23,470** | **24,372** | **22,517** | **16,862** | **16,813** | **8,037** | **32,336** | **36,263** | **49,362** | **50,659** | **45,439** | **31,324** | **30,411** | **19,113** |

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[1] Included in "Other States."

TABLE 12.—***Metallurgical plants:*** *Days of labor performed and average number of days plants were operated, by States, 1914 to 1921.*

DAYS OF LABOR PERFORMED.

| State. | Ore-dressing plants. | | | | | | | | Smelting plants. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| Alabama | 17,250 | 5,572 | 16,488 | 44,715 | 57,429 | 30,286 | 38,216 | 3,594 | | | | | | | | |
| Alaska | 76,046 | 159,078 | 333,360 | 139,960 | 111,896 | 133,614 | 167,076 | 175,810 | | | | | | | | |
| Arizona | 437,061 | 551,719 | 790,821 | 803,567 | 1,119,017 | 725,921 | 624,922 | 157,086 | 875,543 | 910,120 | 1,210,377 | 1,520,283 | 1,627,441 | 560,707 | 947,232 | 185,256 |
| Arkansas | | 22,400 | 42,730 | 38,343 | 17,090 | 7,475 | 37,350 | | | | 75,240 | 182,575 | 162,975 | 243,925 | 147,070 | 58,040 |
| California | 153,471 | 243,708 | 234,004 | 271,800 | 442,391 | 155,511 | 136,219 | 103,516 | 314,162 | 371,847 | 382,190 | 212,400 | 229,886 | 115,133 | 109,314 | 98,930 |
| Colorado | 292,491 | 365,678 | 414,681 | 514,500 | 565,648 | 362,217 | 317,982 | 190,125 | 1,006,670 | 839,587 | 929,559 | 859,200 | 801,270 | 524,870 | 455,156 | 157,375 |
| Georgia | | 14,540 | 19,430 | 24,769 | | 3,883 | | | | | | | | | | |
| Idaho | 116,527 | 131,352 | 188,673 | 179,238 | 135,221 | 121,734 | 160,659 | 95,088 | | | | | | | | |
| Illinois | 36,325 | | 10,742 | 43,008 | 45,840 | 33,410 | 32,089 | 20,096 | 1,167,544 | 1,247,660 | 1,630,241 | 1,319,525 | 1,341,285 | 832,610 | 881,769 | 307,960 |
| Kansas | | 25,584 | 23,853 | 32,190 | 31,005 | 50,629 | 47,438 | 36,208 | 337,890 | 736,108 | 1,224,975 | 623,042 | 169,679 | 281,470 | 304,551 | |
| Maryland | | | 1,395 | 5,432 | | | | | | | 456,500 | 1,117,802 | 854,689 | | | |
| Michigan | 493,875 | 721,634 | 703,788 | 752,874 | 596,086 | 563,752 | 428,298 | 224,616 | | 224,250 | 326,669 | 371,479 | 306,790 | 258,605 | 176,680 | 83,110 |
| Minnesota | | 48,385 | 71,663 | 80,703 | 94,522 | 83,016 | 87,637 | 41,623 | | | | | | | | |
| Missouri | 401,615 | 394,850 | 399,764 | 392,225 | 294,256 | 221,938 | 252,183 | 185,891 | 353,126 | 400,689 | 541,880 | 569,400 | 334,238 | 267,727 | 351,635 | |
| Montana | 517,458 | 796,575 | 645,679 | 605,705 | 747,166 | 359,015 | 372,350 | 98,417 | 792,731 | 1,200,496 | 979,580 | 752,157 | 765,125 | 467,229 | 425,459 | 166,364 |
| Nevada | 457,581 | 462,322 | 514,024 | 486,255 | 521,580 | 325,020 | 298,950 | 122,258 | 253,006 | 259,972 | 305,372 | 413,423 | 467,130 | 301,590 | 234,083 | 31,098 |
| New Jersey | 135,312 | 182,230 | 241,165 | 165,308 | 203,831 | 179,166 | 153,150 | 111,028 | 1,214,362 | 1,487,345 | 1,778,862 | 1,536,773 | 1,503,858 | 823,662 | 957,916 | 635,830 |
| New Mexico | 235,843 | 263,494 | 464,224 | 290,846 | 252,373 | 185,184 | 155,812 | 29,657 | | | 16,464 | 22,680 | | | | |
| New York | 31,151 | 104,382 | 152,632 | 156,601 | 107,088 | 224,526 | 265,708 | 151,797 | 64,500 | | 154,200 | | | 62,461 | | |
| North Carolina | | 18,265 | 15,186 | 11,285 | 13,436 | 10,207 | | | | | | | | | | |
| Oklahoma | 118,217 | 26,397 | 21,283 | 103,933 | 115,516 | 287,584 | 295,198 | 57,752 | 424,145 | 612,835 | 1,646,034 | 1,827,884 | 994,487 | 735,200 | 575,247 | 235,383 |
| Oregon | 33,960 | 16,879 | 11,969 | 23,637 | 20,854 | 19,798 | 14,530 | 1,278 | | | 7,568 | | | | | |
| Pennsylvania | | | 7,830 | 5,165 | 12,771 | 13,425 | 30,195 | | 452,803 | 661,376 | 931,710 | 1,332,500 | 1,382,795 | 1,081,704 | 1,068,518 | 583,709 |
| South Dakota | 129,410 | 138,182 | 115,978 | 87,475 | 96,189 | 92,227 | 90,033 | 87,413 | | | 2,359 | | | | | |
| Tennessee | 27,131 | 79,091 | 120,370 | 114,513 | 66,538 | 49,565 | 109,362 | 33,285 | 105,229 | | 70,200 | | | 67,350 | | |
| Texas | 18,465 | | 17,370 | 29,330 | 18,375 | | | | | 335,435 | 351,495 | 400,962 | 405,521 | 174,764 | 245,398 | 1,641,517 |
| Utah | 719,243 | 601,358 | 1,073,745 | 1,459,383 | 691,255 | 483,852 | 364,689 | 183,705 | 1,013,095 | 802,270 | 878,426 | 952,918 | 1,158,145 | 667,450 | 640,957 | 410,655 |
| Vermont | | 36,822 | 42,074 | 58,308 | 57,419 | 16,420 | 39,609 | 11,189 | | | 400 | | | | | |
| Virginia | 24,330 | 153,397 | 136,038 | 206,921 | 155,436 | 158,846 | 156,637 | 16,982 | | | 86,956 | | | 49,757 | | |
| Washington | 3,520 | | 4,059 | 11,800 | 37,775 | 19,302 | 34,424 | 4,065 | | 315,725 | 351,275 | | | 479,405 | 283,238 | |
| West Virginia | | | | | | | | | 294,015 | 304,368 | 339,024 | 380,578 | 253,608 | 189,270 | 200,570 | 115,145 |
| Wisconsin | 39,624 | 80,296 | 112,854 | 64,011 | 58,667 | 58,116 | 46,160 | 8,981 | | | 1,500 | 37,225 | | 30,059 | 54,558 | |
| Other States | 51,623 | 87,994 | 93,211 | 107,699 | 68,294 | 82,906 | 287,035 | 259,688 | 1,031,948 | 168,403 | 129,990 | 764,837 | 872,679 | 1,182,134 | 1,063,835 | 1,023,597 |
| **Total** | **4,567,529** | **5,732,184** | **7,041,083** | **7,311,499** | **6,754,962** | **5,058,545** | **5,043,911** | **2,411,148** | **9,700,769** | **10,878,486** | **14,809,046** | **15,197,643** | **13,631,601** | **9,397,082** | **9,123,186** | **5,733,969** |

TABLE 12.—***Metallurgical plants:*** *Days of labor performed and average number of days plants were operated, by States, 1914 to 1921*—Continued.

AVERAGE DAYS ACTIVE.

| State. | Ore-dressing plants. | | | | | | | | Smelting plants. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| Alabama | 173 | 98 | 179 | 232 | 182 | 149 | 197 | 80 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Alaska | 338 | 306 | 360 | 300 | 333 | 356 | 364 | 303 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Arizona | 333 | 311 | 332 | 306 | 337 | 338 | 345 | 203 | 351 | 324 | 349 | 346 | 364 | 334 | 365 | 114 |
| Arkansas | ........ | 252 | 247 | 235 | 231 | 258 | 261 | ........ | ........ | ........ | 184 | 344 | 350 | 343 | 334 | 215 |
| California | 264 | 318 | 295 | 360 | 360 | 246 | 268 | 274 | 343 | 354 | 333 | 360 | 360 | 248 | 328 | 316 |
| Colorado | 305 | 300 | 300 | 300 | 300 | 269 | 310 | 284 | 358 | 361 | 300 | 300 | 300 | 365 | 332 | 307 |
| Georgia | ........ | 255 | 286 | 302 | ........ | 185 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Idaho | 264 | 279 | 309 | 279 | 299 | 246 | 314 | 259 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Illinois | 221 | ........ | 185 | 276 | 304 | 278 | 265 | 251 | 362 | 360 | 344 | 354 | 361 | 322 | 362 | 324 |
| Kansas | ........ | 224 | 298 | 156 | 211 | 261 | 227 | 264 | 359 | 285 | 339 | 290 | 200 | 356 | 357 | ........ |
| Maryland | ........ | ........ | 155 | 209 | ........ | ........ | ........ | ........ | ........ | ........ | 351 | 327 | 325 | ........ | ........ | ........ |
| Michigan | 280 | 307 | 312 | 310 | 306 | 314 | 302 | 245 | ........ | 310 | 326 | 310 | 309 | 338 | 302 | 178 |
| Minnesota | ........ | 201 | 251 | 239 | 168 | 159 | 158 | 151 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Missouri | 274 | 270 | 291 | 258 | 274 | 253 | 317 | 296 | 360 | 347 | 354 | 365 | 273 | 268 | 334 | ........ |
| Montana | 303 | 325 | 300 | 295 | 317 | 327 | 332 | 193 | 316 | 359 | 306 | 314 | 312 | 346 | 350 | 257 |
| Nevada | 328 | 330 | 330 | 311 | 360 | 360 | 336 | 247 | 348 | 360 | 351 | 362 | 360 | 361 | 348 | 146 |
| New Jersey | 308 | 324 | 337 | 308 | 304 | 296 | 300 | 252 | 340 | 361 | 365 | 356 | 364 | 274 | 361 | 365 |
| New Mexico | 318 | 346 | 345 | 326 | 326 | 315 | 265 | 111 | ........ | ........ | 343 | 149 | ........ | ........ | ........ | ........ |
| New York | 215 | 282 | 269 | 277 | 246 | 283 | 292 | 245 | 307 | ........ | 271 | ........ | ........ | 268 | ........ | ........ |
| North Carolina | ........ | 194 | 276 | 245 | 292 | 237 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Oklahoma | 293 | 234 | 226 | 230 | 245 | 269 | 285 | 164 | 351 | 365 | 318 | 361 | 325 | 340 | 309 | 239 |
| Oregon | 239 | 245 | 155 | 244 | 311 | 208 | 303 | 46 | ........ | ........ | 344 | ........ | ........ | ........ | ........ | ........ |
| Pennsylvania | ........ | ........ | 313 | 215 | 228 | 258 | 336 | ........ | 354 | 328 | 361 | 360 | 364 | 345 | 362 | 352 |
| South Dakota | 361 | 350 | 320 | 350 | 316 | 320 | 363 | 363 | ........ | ........ | 147 | ........ | ........ | ........ | ........ | ........ |
| Tennessee | 312 | 241 | 262 | 269 | 250 | 241 | 299 | 169 | 352 | ........ | 351 | ........ | ........ | 330 | ........ | ........ |
| Texas | 324 | ........ | 290 | 293 | 255 | ........ | ........ | ........ | ........ | 365 | 365 | 365 | 363 | 355 | 364 | 364 |
| Utah | 350 | 361 | 356 | 356 | 356 | 350 | 343 | 249 | 365 | 365 | 365 | 359 | 365 | 364 | 361 | 323 |
| Vermont | ........ | 281 | 307 | 271 | 298 | 249 | 296 | 233 | ........ | ........ | 50 | ........ | ........ | ........ | ........ | ........ |
| Virginia | 243 | 314 | 286 | 292 | 283 | 245 | 261 | 152 | ........ | ........ | 346 | ........ | ........ | 215 | ........ | ........ |
| Washington | 196 | ........ | 239 | 187 | 257 | 244 | 194 | 156 | ........ | 365 | 336 | ........ | ........ | 331 | 365 | ........ |
| West Virginia | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | 356 | 365 | 364 | 349 | 356 | 310 | 313 | 321 |
| Wisconsin | 226 | 316 | 268 | 259 | 301 | 265 | 278 | 130 | ........ | ........ | 300 | 329 | ........ | 354 | 361 | ........ |
| Other States | 178 | 247 | 274 | 239 | 213 | 225 | 248 | 247 | 332 | 327 | 361 | 346 | 350 | 317 | 346 | 327 |
| **Total** | **302** | **309** | **315** | **303** | **310** | **293** | **300** | **240** | **348** | **347** | **338** | **342** | **342** | **326** | **350** | **307** |

TABLE 13.—***Metallurgical plants:*** *Fatalities and number killed per 1,000 300-day workers employed, by causes, 1914 to 1921.*

| Cause of accident. | Number killed. | | | | | | | | Number killed per 1,000 300-day workers. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| Ore-dressing plants: | | | | | | | | | | | | | | | | |
| 1. Haulage (cars and motors) | ........ | 3 | 3 | 7 | 4 | ........ | 1 | 1 | ........ | 0.16 | 0.13 | 0.28 | 0.18 | ........ | 0.06 | 0.12 |
| 2. Railway cars or locomotives | 3 | 2 | 4 | 4 | 1 | 2 | ........ | ........ | 0.20 | .10 | .17 | .17 | .04 | 0.12 | ........ | ........ |
| 3. Crushers, rolls, or stamps | 2 | 5 | ........ | 3 | ........ | 1 | 2 | 1 | .13 | .26 | ........ | .12 | ........ | .06 | .12 | .12 |
| 4. Tables, jigs, etc | ........ | ........ | ........ | 2 | ........ | 1 | ........ | ........ | ........ | ........ | ........ | .08 | ........ | .06 | ........ | ........ |
| 5. Other machinery | 6 | 7 | 11 | 9 | 14 | 6 | 8 | 2 | .39 | .37 | .47 | .37 | .62 | .36 | .48 | .25 |
| 6. Falls of persons | 3 | 6 | 2 | 9 | 6 | 4 | 2 | ........ | .20 | .31 | .08 | .37 | .26 | .24 | .12 | ........ |
| 7. Suffocation in ore bins | 2 | 3 | 3 | 3 | 2 | 4 | 4 | ........ | .13 | .16 | .13 | .12 | .09 | .24 | .24 | ........ |
| 8. Falling objects (rocks, timbers, etc.) | 3 | ........ | 1 | 4 | ........ | 1 | ........ | ........ | .20 | ........ | .04 | .17 | ........ | .06 | ........ | ........ |
| 9. Cyanide or other poisoning | ........ | ........ | ........ | ........ | 1 | 1 | ........ | ........ | ........ | ........ | ........ | ........ | .04 | .06 | ........ | ........ |
| 10. Scalding (steam or water) | ........ | ........ | 2 | 1 | ........ | 1 | ........ | ........ | ........ | ........ | .09 | .04 | ........ | .06 | ........ | ........ |
| 11. Electricity | 2 | 3 | 2 | 4 | 3 | 2 | 2 | ........ | .13 | .16 | .09 | .17 | .15 | .12 | .12 | ........ |
| 12. Hand tools, axes, bars, etc | ........ | ........ | 1 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | .04 | ........ | ........ | ........ | ........ | ........ |
| 13. Nails, splinters, etc. | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| 14. Flying pieces of rock from sledging or crushing | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| 15. Other causes | 2 | 1 | 4 | 1 | 4 | 2 | 2 | ........ | .13 | .05 | .17 | .04 | .17 | .12 | .12 | ........ |
| **Total** | **23** | **30** | **33** | **47** | **35** | **25** | **21** | **4** | **1.51** | **1.57** | **1.41** | **1.93** | **1.55** | **1.48** | **1.25** | **.50** |
| Smelting plants: | | | | | | | | | | | | | | | | |
| 16. Haulage (cars, motors, etc.) | 3 | 10 | 4 | 7 | 8 | 6 | 4 | 2 | .09 | .27 | .08 | .14 | .18 | .20 | .13 | .10 |
| 17. Railway cars or locomotives | 7 | 2 | 2 | 4 | 5 | ........ | ........ | ........ | .22 | .06 | .04 | .08 | .11 | ........ | ........ | ........ |
| 18. Cranes | ........ | 2 | 5 | 3 | 2 | 6 | ........ | ........ | ........ | .06 | .10 | .06 | .04 | .20 | ........ | ........ |
| 19. Other machinery | 3 | 5 | 3 | 9 | 13 | 4 | 5 | 2 | .09 | .13 | .06 | .18 | .29 | .13 | .17 | .10 |
| 20. Falls of persons | 6 | 3 | 9 | 8 | 4 | 4 | 3 | 2 | .19 | .08 | .18 | .15 | .09 | .13 | .10 | .10 |
| 21. Suffocation in ore bins | 2 | 1 | 1 | 1 | ........ | 1 | ........ | 2 | .06 | .03 | .02 | .02 | ........ | .03 | ........ | .10 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22. Flying or falling objects (rocks, timbers, etc.)........ | 1 | 1 | 4 | 2 | ........ | 2 | 3 | 1 | .03 | .03 | .08 | .04 | ........ | .06 | .10 | .05 |
| 23. Gas (burns or asphyxiation)...... | ........ | 3 | 1 | ........ | ........ | 1 | ........ | ........ | ........ | .08 | .02 | ........ | ........ | .03 | ........ | ........ |
| 24. Scalding (steam or water)............ | 1 | 2 | 1 | 2 | ........ | ........ | 1 | 1 | .03 | .06 | .02 | .04 | ........ | ........ | .03 | .05 |
| 25. Electricity........ | 2 | 4 | 1 | 9 | 3 | 2 | 1 | ........ | .06 | .11 | .02 | .18 | .06 | .06 | .03 | ........ |
| 26. Hand tools, axes, bars, etc.......... | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| 27. Nails, splinters, etc. | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| 28. Burns from matte, slag, or molten metal (pouring or spilling).......... | 2 | 3 | 1 | 2 | 4 | 2 | ........ | 1 | .06 | .08 | .02 | .04 | .09 | .06 | ........ | .05 |
| 29. Hot-metal explosions............ | ........ | 1 | 3 | 2 | 2 | 2 | 1 | ........ | ........ | .03 | .06 | .04 | .04 | .06 | .03 | ........ |
| 30. Other causes...... | 6 | 1 | 1 | 4 | 1 | 4 | 2 | 3 | .19 | .03 | .02 | .08 | .02 | .13 | .07 | .16 |
| **Total**........... | **33** | **38** | **36** | **53** | **42** | **34** | **20** | **14** | **1.02** | **1.05** | **.73** | **1.05** | **.92** | **1.09** | **.66** | **.73** |

TABLE 14.—***Metallurgical plants:*** *Percentage of fatalities and injuries, by causes, 1914 to 1921.*

| Cause of accident. | Killed. | | | | | | | | Injured. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| Ore-dressing plants: | | | | | | | | | | | | | | | | |
| 1. Haulage (cars and motors) | ....... | 10.00 | 9.09 | 14.89 | 11.43 | ....... | 4.76 | 25.00 | 5.51 | 5.06 | 4.59 | 4.57 | 3.41 | 5.40 | 4.84 | 4.37 |
| 2. Railway cars or locomotives | 13.04 | 6.67 | 12.12 | 8.51 | 2.86 | 8.00 | ....... | ....... | 2.65 | .81 | 1.32 | .98 | 2.17 | 2.33 | .91 | 1.40 |
| 3. Crushers, rolls, or stamps | 8.70 | 16.67 | ....... | 6.38 | ....... | 4.00 | 9.52 | 25.00 | 4.46 | 6.16 | 5.28 | 3.80 | 3.53 | 5.25 | 3.89 | 5.77 |
| 4. Tables, jigs, etc | ....... | ....... | ....... | 4.26 | ....... | 4.00 | ....... | ....... | 3.21 | 2.82 | 2.57 | 2.07 | 2.93 | 2.87 | 1.60 | 1.40 |
| 5. Other machinery | 26.08 | 23.33 | 33.34 | 19.15 | 40.00 | 24.00 | 38.10 | 50.00 | 11.85 | 14.27 | 10.55 | 9.55 | 11.71 | 13.81 | 10.98 | 10.71 |
| 6. Falls of persons | 13.04 | 20.00 | 6.06 | 19.15 | 17.14 | 16.00 | 9.52 | ....... | 14.30 | 11.89 | 11.71 | 13.52 | 13.18 | 9.77 | 12.31 | 10.87 |
| 7. Suffocation in ore bins | 8.70 | 10.00 | 9.09 | 6.38 | 5.71 | 16.00 | 19.05 | ....... | .14 | .14 | .13 | .20 | .36 | .24 | .15 | .41 |
| 8. Falling objects (rocks, timbers, etc.) | 13.04 | ....... | 3.03 | 8.51 | ....... | 4.00 | ....... | ....... | 15.48 | 9.16 | 11.40 | 12.57 | 12.38 | 9.72 | 10.79 | 8.15 |
| 9. Cyanide or other poisoning | ....... | ....... | ....... | ....... | 2.86 | 4.00 | ....... | ....... | .63 | 1.10 | .41 | .81 | 1.43 | .53 | .61 | .33 |
| 10. Scalding (steam or water) | ....... | ....... | 6.06 | 2.13 | ....... | 4.00 | ....... | ....... | .63 | .57 | 1.10 | .61 | .45 | 1.65 | .84 | 1.81 |
| 11. Electricity | 8.70 | 10.00 | 6.06 | 8.51 | 8.57 | 8.00 | 9.52 | ....... | 2.09 | 1.81 | 1.66 | 1.36 | 2.01 | 1.12 | 1.37 | 1.98 |
| 12. Hand tools, axes, bars, etc | ....... | ....... | 3.03 | ....... | ....... | ....... | ....... | ....... | 9.27 | 11.22 | 11.31 | 8.43 | 9.49 | 8.12 | 9.95 | 8.90 |
| 13. Nails, splinters, etc | ....... | ....... | ....... | ....... | ....... | ....... | ....... | ....... | 5.44 | 6.25 | 5.37 | 6.54 | 5.25 | 4.72 | 4.57 | 5.27 |
| 14. Flying pieces of rock from sledging or crushing | ....... | ....... | ....... | ....... | ....... | ....... | ....... | ....... | 3.49 | 3.63 | 3.42 | 10.23 | 6.30 | 6.81 | 6.82 | 6.01 |
| 15. Other causes | 8.70 | 3.33 | 12.12 | 2.13 | 11.43 | 8.00 | 9.52 | ....... | 20.85 | 25.11 | 29.18 | 24.76 | 25.40 | 27.66 | 30.37 | 32.62 |
| **Total** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** |
| Smelting plants: | | | | | | | | | | | | | | | | |
| Number killed or injured by— | | | | | | | | | | | | | | | | |
| 16. Haulage (cars, motors, etc.) | 9.09 | 26.31 | 11.11 | 13.21 | 19.05 | 17.65 | 20.00 | 14.29 | 8.73 | 9.25 | 8.43 | 8.95 | 8.29 | 7.90 | 5.74 | 5.68 |
| 17. Railway cars or locomotives | 21.22 | 5.26 | 5.55 | 7.55 | 11.91 | ....... | ....... | ....... | 1.96 | 1.07 | 1.21 | 1.46 | 1.29 | 1.04 | 1.74 | 1.32 |
| 18. Cranes | ....... | 5.26 | 13.89 | 5.66 | 4.76 | 17.65 | ....... | ....... | .97 | 1.01 | 1.35 | 1.89 | 1.44 | 1.35 | 1.23 | 1.50 |
| 19. Other machinery | 9.09 | 13.16 | 8.33 | 16.98 | 30.96 | 11.77 | 25.00 | 14.29 | 4.41 | 5.07 | 3.99 | 4.84 | 5.59 | 4.90 | 4.46 | 4.51 |
| 20. Falls of persons | 18.18 | 7.90 | 25.00 | 15.10 | 9.52 | 11.77 | 15.00 | 14.29 | 10.93 | 8.73 | 7.84 | 7.28 | 7.36 | 7.45 | 7.11 | 6.86 |
| 21. Suffocation in ore bins | 6.06 | 2.63 | 2.78 | 1.89 | ....... | 2.94 | ....... | 14.29 | .02 | .14 | .01 | .94 | .07 | .04 | .10 | ....... |
| 22. Flying of falling objects (rocks, timbers, etc.) | 3.03 | 2.63 | 11.11 | 3.77 | ....... | 5.88 | 15.00 | 7.14 | 18.54 | 15.99 | 14.89 | 14.29 | 15.57 | 16.57 | 14.69 | 13.48 |
| 23. Gas (burns or asphyxiation) | ....... | 7.90 | 2.78 | ....... | ....... | 2.94 | ....... | ....... | 1.04 | 1.19 | 1.16 | .62 | 2.02 | 1.35 | .96 | .70 |
| 24. Scalding (steam or water) | 3.03 | 5.26 | 2.78 | 3.77 | ....... | ....... | 5.00 | 7.14 | 1.09 | .80 | 1.37 | .98 | 1.01 | .88 | 1.13 | .94 |
| 25. Electricity | 6.06 | 10.53 | 2.78 | 16.98 | 7.14 | 5.88 | 5.00 | ....... | .86 | .80 | .37 | .48 | .61 | .70 | .55 | .28 |
| 26. Hand tools, axes, bars, etc | ....... | ....... | ....... | ....... | ....... | ....... | ....... | ....... | 10.33 | 11.07 | 9.06 | 9.50 | 8.33 | 7.61 | 9.98 | 8.41 |
| 27. Nails, splinters, etc | ....... | ....... | ....... | ....... | ....... | ....... | ....... | ....... | 1.69 | 2.55 | 2.61 | 2.69 | 2.42 | 1.58 | 2.10 | 2.40 |
| 28. Burns from matte, slag, or molten metal (pouring or spilling) | 6.06 | 7.90 | 2.78 | 3.77 | 9.52 | 5.88 | ....... | 7.14 | 16.90 | 15.64 | 22.40 | 19.21 | 19.13 | 21.64 | 21.63 | 18.84 |
| 29. Hot-metal explosions | ....... | 2.63 | 8.33 | 3.77 | 4.76 | 5.88 | 5.00 | ....... | 2.86 | 2.80 | 2.25 | 3.12 | 13.78 | 2.14 | 1.50 | 2.58 |
| 30. Other causes | 18.18 | 2.63 | 2.78 | 7.55 | 2.38 | 11.77 | 10.00 | 21.42 | 19.67 | 23.89 | 23.06 | 23.75 | 23.09 | 24.85 | 27.08 | 32.50 |
| **Total** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** |

**TABLE 15.—*Copper metallurgical plants:*** *Summary of labor and accidents at **selected** plants, 1918 to 1921.*

| | 1918 | | 1919 | | 1920 | | 1921 | |
|---|---|---|---|---|---|---|---|---|
| | Mills. | Smelters. | Mills. | Smelters. | Mills. | Smelters. | Mills. | Smelters. |
| Number of plants | 44 | 25 | 23 | 21 | 29 | 24 | 28 | 23 |
| Men employed | 8,222 | 12,363 | 4,711 | 9,294 | 5,218 | 8,388 | 2,286 | 5,339 |
| Number of 300-day workers | 9,037 | 14,038 | 5,452 | 9,675 | 5,957 | 8,816 | 1,450 | 4,490 |
| Total days' labor (shifts) | 2,711,186 | 4,211,381 | 1,635,520 | 2,902,514 | 1,787,219 | 2,644,834 | 435,069 | 1,346,976 |
| Average days active | 330 | 341 | 347 | 312 | 343 | 315 | 190 | 252 |
| Number killed | 13 | 13 | 8 | 17 | 2 | 5 | ........ | 8 |
| Number injured | 1,521 | 2,227 | 691 | 1,471 | 885 | 1,481 | 251 | 611 |
| Number killed per 1,000 300-day workers | 1.44 | .93 | 1.47 | 1.76 | .34 | .57 | ........ | 1.78 |
| Number injured per 1,000 300-day workers | 168.31 | 158.64 | 126.74 | 152.04 | 148.56 | 167.99 | 173.10 | 136.08 |

TABLE 16.—*Copper metallurgical plants: Accidents, by causes, at selected plants, 1918 to 1921.*

| Cause of accident. | 1918 | | | | 1919 | | | | 1920 | | | | 1921 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mills. | | Smelters. | | Mills. | | Smelters. | | Mills. | | Smelters. | | Mills. | | Smelters. | |
| | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. |
| Haulage system (cars, motors, etc.) | 2 | 41 | 2 | 147 | ... | 27 | 4 | 115 | 1 | 43 | 1 | 121 | ... | 8 | ... | 32 |
| Railway cars and locomotives | ... | 32 | ... | 43 | ... | 11 | ... | 39 | ... | 7 | ... | 43 | ... | 3 | ... | 16 |
| Crushers, rolls, or stamps | ... | 26 | ... | ... | ... | 22 | ... | ... | ... | 22 | ... | ... | ... | 9 | ... | ... |
| Tables, jigs, etc | ... | 44 | ... | ... | 1 | 18 | ... | ... | ... | 16 | ... | ... | ... | 3 | ... | ... |
| Cranes | ... | ... | 1 | 43 | ... | ... | 3 | 45 | ... | ... | ... | 30 | ... | ... | ... | 20 |
| Other machinery | 7 | 161 | 3 | 114 | 2 | 84 | 1 | 82 | 1 | 90 | ... | 75 | ... | 28 | ... | 25 |
| Falls of persons | 1 | 230 | 1 | 178 | 1 | 88 | ... | 152 | ... | 125 | 2 | 132 | ... | 37 | 2 | 60 |
| Suffocation in ore bins | ... | 7 | ... | 4 | 2 | ... | 1 | 1 | ... | 3 | ... | 4 | ... | ... | 2 | ... |
| Falling objects (rocks, timbers, etc.) | ... | 208 | ... | 402 | ... | 67 | 1 | 263 | ... | 85 | ... | 258 | ... | 27 | 1 | 127 |
| Cyanide or other poisoning | ... | 31 | ... | ... | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Gas (burns or asphyxiation) | ... | ... | ... | 11 | ... | ... | 1 | 14 | ... | ... | ... | 4 | ... | ... | ... | 1 |
| Scalding (steam or water) | ... | 6 | ... | 15 | 1 | 9 | ... | 18 | ... | 10 | ... | 15 | ... | 2 | 1 | 4 |
| Electricity | ... | 42 | 1 | 22 | ... | 6 | 1 | 18 | ... | 17 | ... | 13 | ... | 5 | ... | 4 |
| Hand tools, axes, bars, etc | ... | 175 | ... | 237 | ... | 67 | ... | 120 | ... | 103 | ... | 151 | ... | 24 | ... | 55 |
| Nails, splinters, etc | ... | 97 | ... | 66 | ... | 44 | ... | 26 | ... | 40 | ... | 27 | ... | 4 | ... | 16 |
| Flying pieces of rock from sledging or crushing | ... | 42 | ... | ... | ... | 21 | ... | ... | ... | 27 | ... | ... | ... | 15 | ... | ... |
| Burns from matte, slag, or molten metal | ... | ... | 3 | 328 | ... | ... | ... | 235 | ... | ... | ... | 259 | ... | ... | 1 | 68 |
| Hot-metal explosions | ... | ... | 2 | 66 | ... | ... | 2 | 44 | ... | ... | 1 | 20 | ... | ... | ... | 24 |
| Other causes | 3 | 379 | ... | 551 | 1 | 225 | 3 | 299 | ... | 297 | 1 | 329 | ... | 86 | 1 | 159 |
| **Total** | **13** | **1,521** | **13** | **2,227** | **8** | **691** | **17** | **1,471** | **2** | **885** | **5** | **1,481** | **0** | **251** | **8** | **611** |

## ACCIDENT RATES FOR MINERAL INDUSTRIES.

Accidents in all branches of the mineral industry in the United States, including coal mines, metal mines, quarries, coke ovens, and metallurgical plants (except iron-blast furnaces) resulted in the death of 2,367 men in 1921 according to figures compiled by the Bureau of Mines. In 1920 the fatal accidents in the same industries were 2,984. Nonfatal injuries at coal mines are not reported to the Bureau of Mines; for all other mines, quarries, etc., the number of employees injured was 35,416 as against 56,057 in 1920.

Accidents at coal mines killed 1,973 men as compared with 2,271 in 1920; at metal mines 230 men were killed and 18,604 injured, as against 425 killed and 32,562 injured the year before; at stone quarries 120 men were killed and 10,465 injured, as compared with 178 killed and 11,217 injured in 1920.

Though these figures, compared with those for 1920, indicate a reduction in fatal and nonfatal accidents, the number of accidents per thousand men employed shows an increase. The fatality rate for all workings combined was 3.59 per thousand employees (on a standard basis of 300 working days per year) as against 3.29 in 1920; whereas the injury rate for all plants (except coal mines) was 192.69 per thousand employees as compared with 182.51 in 1920.

The increase in accident rates per thousand men employed may be largely attributed to the part-time operation which prevailed in the mining industry in 1921, since periods of idleness or intermittent work are generally followed by an increase in accidents.

The total shifts worked by all employees was 197,560,952, a loss of about 27 per cent from the preceding year. Each employee averaged only 189 working days as compared with 249 in 1920. Coal-mine employees averaged only 173 days, a loss of 57 days per man as compared with 1920; employees at iron mines worked 210 days, a loss of 85 days each; copper-mine employees averaged 244 days, a loss of 73 days each; employees at stone quarries averaged 233 days, a loss of 34 days each.

A summary of accident rates in the mineral industry for each year covered by the reports of the Bureau of Mines is given in Tables 18 and 19.

**Table 17.**—*Fatality rates in different branches of mineral industries in 1921, compared on a 300-day basis (length of shift not considered).*

| Branch of mineral industry. | Average days active. | Men employed. | | Days of labor performed. | Killed. | Injured. | Number killed or injured per 1,000 300-day workers. | |
|---|---|---|---|---|---|---|---|---|
| | | Actual number. | Equivalent in 300-day workers (calculated). | | | | Killed. | Injured. |
| Coal mines | 173 | 823, 253 | 474, 743 | 142, 422, 769 | 1, 973 | (1) | 4. 16 | ........ |
| All metal mines | 238 | 93, 929 | 74, 510 | 22, 352, 702 | 230 | 18, 604 | 3. 09 | 249. 68 |
| Copper mines | 244 | 18, 300 | 14, 871 | 4, 461, 296 | 55 | 4, 722 | 3. 70 | 317. 53 |
| Gold and miscellaneous metal mines | 269 | 26, 516 | 23, 738 | 7, 121, 402 | 78 | 5, 352 | 3. 29 | 225. 46 |
| Iron mines | 210 | 30, 559 | 21, 369 | 6, 410, 573 | 65 | 4, 507 | 3. 04 | 210. 91 |
| Lead and zinc mines (Mississippi Valley) | 234 | 6, 948 | 5, 431 | 1, 629, 191 | 14 | 2, 062 | 2. 58 | 379. 67 |
| Nonmetallic mineral mines | 235 | 11, 606 | 9, 101 | 2, 730, 240 | 18 | 1, 961 | 1. 98 | 215. 47 |
| All quarries (including outside works) | 233 | 77, 185 | 59, 958 | 17, 987, 547 | 120 | 10, 465 | 2. 00 | 174. 54 |
| Cement-rock quarries | 290 | 10, 815 | 10, 459 | 3, 137, 789 | 20 | 2, 233 | 1. 91 | 213. 50 |
| Granite quarries | 222 | 9, 479 | 7, 010 | 2, 102, 854 | 18 | 940 | 2. 57 | 134. 09 |
| Limestone quarries | 223 | 39, 551 | 29, 394 | 8, 819, 813 | 58 | 5, 248 | 1. 97 | 178. 51 |
| Marble quarries | 265 | 4, 549 | 4, 025 | 1, 207, 467 | 6 | 406 | 1. 49 | 100. 87 |
| Sandstone and bluestone quarries | 183 | 3, 928 | 2, 394 | 718, 310 | 3 | 374 | 1. 25 | 156. 22 |
| Slate quarries | 240 | 3, 564 | 2, 848 | 854, 396 | 4 | 385 | 1. 40 | 135. 18 |
| Trap-rock quarries | 216 | 5, 299 | 3, 823 | 1, 146, 918 | 11 | 879 | 2. 88 | 229. 92 |
| All quarries (excluding outside works) | 220 | 49, 292 | 36, 082 | 10, 824, 541 | 80 | 6, 029 | 2. 22 | 167. 09 |
| All quarries (outside works only) | 257 | 27, 893 | 23, 877 | 7, 163, 006 | 40 | 4, 436 | 1. 68 | 185. 79 |
| Metallurgical plants | 284 | 37, 465 | 35, 458 | 10, 637, 636 | 27 | 4, 494 | . 76 | 126. 74 |
| Ore-dressing plants | 240 | 10, 047 | 8, 037 | 2, 411, 148 | 4 | 1, 214 | . 50 | 151. 05 |
| Smelters | 307 | 18, 656 | 19, 113 | 5, 733, 969 | 14 | 2, 129 | . 73 | 111. 39 |
| Auxiliary works | 284 | 8, 762 | 8, 308 | 2, 492, 519 | 9 | 1, 151 | 1. 08 | 138. 54 |
| All coke ovens | 257 | 16, 204 | 13, 868 | 4, 160, 298 | 17 | 1, 853 | 1. 23 | 133. 62 |
| Beehive coke ovens | 141 | 6, 011 | 2, 835 | 850, 543 | 5 | 336 | 1. 76 | 118. 52 |
| By-product coke ovens | 325 | 10, 193 | 11, 033 | 3, 309, 755 | 12 | 1, 517 | 1. 09 | 137. 50 |
| **Total, 1921** | 189 | 1, 048, 036 | 658, 537 | 197, 560, 952 | 2, 367 | [1] 35,416 | 3. 59 | 192. 69 |
| Total, 1920 | 249 | 1, 095, 044 | 908, 204 | 272, 460, 757 | 2, 984 | [1] 56,057 | 3. 29 | 182. 51 |

[1] Injuries for coal mines not available.

TABLE 18.—*United States: Number of men **killed** per 1,000 300-day workers employed in mineral industries.*

| | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal mines | 4.97 | 4.46 | 4.70 | 4.66 | 4.44 | 3.93 | 4.25 | 3.94 | 4.27 | 3.78 | 4.16 |
| All metal mines | 4.45 | 4.09 | 3.72 | 3.92 | 3.89 | 3.62 | 4.44 | 3.57 | 3.47 | 3.16 | 3.09 |
| Copper mines | 5.18 | 4.53 | 4.08 | 3.85 | 3.72 | 3.64 | 5.88 | 3.45 | 3.54 | 3.43 | 3.70 |
| Gold and miscellaneous metal mines | 4.28 | 4.32 | 3.83 | 4.06 | 4.79 | 4.05 | 4.03 | 4.27 | 4.41 | 4.20 | 3.29 |
| Iron mines | 4.64 | 3.96 | 3.29 | 3.78 | 2.88 | 3.41 | 3.54 | 3.45 | 3.09 | 2.34 | 3.04 |
| Lead and zinc mines (Mississippi Valley) | 4.03 | 4.28 | 3.90 | 4.32 | 5.37 | 3.14 | 4.09 | 3.58 | 4.13 | 3.27 | 2.58 |
| Nonmetallic mineral mines | 2.01 | 1.66 | 3.02 | 3.72 | 2.43 | 3.00 | 2.48 | 1.67 | 1.65 | 2.89 | 1.98 |
| All quarries (including outside works) | 2.23 | 2.27 | 2.10 | 2.64 | 1.80 | 2.26 | 1.83 | 2.11 | 1.93 | 2.31 | 2.00 |
| Cement-rock quarries | 3.96 | 3.48 | 2.99 | 3.95 | 1.60 | 2.38 | 2.99 | 2.14 | 2.66 | 2.75 | 1.91 |
| Granite quarries | 1.92 | 1.87 | 1.47 | 3.36 | 2.27 | 1.86 | 1.54 | 2.10 | 1.81 | 2.06 | 2.57 |
| Limestone quarries | 2.21 | 2.19 | 2.13 | 2.38 | 1.70 | 2.36 | 1.79 | 1.79 | 1.97 | 2.58 | 1.97 |
| Marble quarries | .71 | 2.48 | 1.81 | 2.72 | 1.00 | 1.16 | .57 | 2.14 | .51 | .92 | 1.49 |
| Sandstone and bluestone quarries | 1.82 | 1.16 | 1.32 | 1.45 | .93 | 1.28 | .99 | 2.38 | .76 | .56 | 1.25 |
| Slate quarries | 2.60 | 2.62 | 3.05 | 2.99 | 2.02 | 2.62 | 1.31 | 3.16 | 1.78 | 1.49 | 1.40 |
| Trap-rock quarries | 1.77 | 3.08 | 2.40 | 2.49 | 3.46 | 4.45 | 2.61 | 4.47 | 2.56 | 2.61 | 2.88 |
| All quarries (excluding outside works) | ........ | ........ | ........ | ........ | 2.17 | 2.32 | 2.00 | 2.19 | 2.29 | 2.81 | 2.22 |
| All quarries (outside works only) | ........ | ........ | ........ | ........ | 1.05 | 2.15 | 1.53 | 1.98 | 1.34 | 1.59 | 1.68 |
| Metallurgical plants: | | | | | | | | | | | |
| Ore-dressing plants | ........ | ........ | .99 | 1.51 | 1.57 | 1.41 | 1.93 | 1.55 | 1.48 | 1.25 | .50 |
| Smelters | ........ | ........ | 1.93 | 1.02 | 1.05 | .73 | 1.05 | .92 | 1.09 | .66 | .73 |
| Auxiliary works | ........ | ........ | ........ | ........ | ........ | .89 | .94 | .85 | .31 | 1.08 | 1.08 |
| All coke ovens | ........ | ........ | 1.97 | 2.12 | 1.21 | 1.32 | 2.14 | 2.06 | 1.92 | 1.64 | 1.23 |
| Beehive coke ovens | ........ | ........ | ........ | ........ | .65 | 1.29 | 1.30 | 1.16 | .92 | 1.09 | 1.76 |
| By-products coke ovens | ........ | ........ | ........ | ........ | 1.75 | 1.35 | 3.13 | 2.84 | 2.55 | 1.92 | 1.09 |

**Table 19.**—*United States: Number of men injured per 1,000 300-day workers employed in mineral industries.*

| | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal mines | | | | | | | | | | | |
| All metal mines | 170.27 | 190.11 | 179.59 | 211.87 | 248.56 | 250.64 | 240.97 | 237.09 | 233.60 | 242.02 | 249.68 |
| Copper mines | 225.25 | 258.42 | 230.80 | 312.19 | 322.01 | 319.58 | 313.35 | 322.12 | 309.60 | 323.20 | 317.53 |
| Gold and miscellaneous metai mines | 80.33 | 93.04 | 70.37 | 126.90 | 201.49 | 190.79 | 172.51 | 185.18 | 191.29 | 204.82 | 225.46 |
| Iron mines | 252.30 | 241.81 | 268.31 | 224.07 | 233.51 | 240.17 | 227.54 | 185.45 | 202.35 | 200.49 | 210.91 |
| Lead and zinc mines (Mississippi Valley) | 139.40 | 158.29 | 133.51 | 189.01 | 238.27 | 263.09 | 272.99 | 319.54 | 292.28 | 327.97 | 379.67 |
| Nonmetallic mineral mines | 34.03 | 66.40 | 84.86 | 99.75 | 107.78 | 144.70 | 123.58 | 104.69 | 139.27 | 161.88 | 215.47 |
| All quarries (including outside works) | 63.85 | 69.82 | 88.81 | 114.92 | 117.30 | 175.62 | 185.14 | 147.07 | 144.20 | 145.51 | 174.54 |
| Cement-rock quarries | 136.52 | 139.59 | 207.99 | 226.20 | 148.25 | 248.83 | 277.73 | 238.65 | 231.58 | 182.49 | 213.50 |
| Granite quarries | 53.07 | 44.87 | 69.60 | 109.21 | 96.72 | 143.99 | 189.73 | 109.68 | 124.70 | 130.53 | 134.09 |
| Limestone quarries | 67.99 | 79.98 | 89.05 | 114.23 | 127.43 | 176.10 | 175.52 | 141.34 | 134.05 | 143.11 | 178.54 |
| Marble quarries | 43.39 | 42.35 | 68.67 | 121.31 | 93.80 | 125.20 | 100.20 | 58.02 | 75.26 | 91.98 | 100.87 |
| Sandstone and bluestone quarries | 34.68 | 45.26 | 74.36 | 69.08 | 66.56 | 127.86 | 118.89 | 148.04 | 131.96 | 100.56 | 156.22 |
| Slate quarries | 17.72 | 15.01 | 18.81 | 28.61 | 33.08 | 85.00 | 112.04 | 96.29 | 98.51 | 108.20 | 135.18 |
| Trap-rock quarries | 69.76 | 68.89 | 87.77 | 152.56 | 232.85 | 237.84 | 222.92 | 205.17 | 186.47 | 208.89 | 229.92 |
| All quarries (excluding outside works) | | | | | 127.57 | 158.63 | 162.95 | 148.29 | 146.65 | 139.62 | 167.09 |
| All quarries (outside works only) | | | | | 96.90 | 206.06 | 223.81 | 145.03 | 140.28 | 154.04 | 185.79 |
| Metallurgical plants: | | | | | | | | | | | |
| Ore-dressing plants | | | 122.38 | 94.19 | 109.65 | 135.66 | 121.12 | 139.54 | 122.21 | 156.07 | 151.05 |
| Smelters | | | 174.71 | 175.44 | 157.69 | 195.61 | 152.88 | 148.40 | 141.46 | 136.37 | 111.39 |
| Auxiliary works | | | | | | 142.10 | 169.33 | 139.63 | 101.29 | 113.92 | 138.54 |
| All coke ovens | | | 107.73 | 103.06 | 90.78 | 153.49 | 188.59 | 219.64 | 145.66 | 114.13 | 133.62 |
| Beehive coke ovens | | | | | 39.84 | 100.37 | 94.43 | 131.11 | 125.96 | 102.54 | 118.52 |
| By-product coke ovens | | | | | 140.00 | 217.09 | 300.06 | 296.06 | 158.33 | 120.04 | 137.50 |

## PUBLICATIONS ON ACCIDENT STATISTICS.

A limited supply of the following publications of the Bureau of Mines has been printed. Requests for publications should be addressed to the Director, Bureau of Mines.

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### PUBLICATIONS AVAILABLE FOR FREE DISTRIBUTION.

BULLETIN 115. Coal-mine fatalities in the United States, 1870–1914, with statistics of coal production, labor, and mining methods, by States and calendar years, compiled by A. H. Fay. 1916. 570 pp. 3 pls. 13 figs.

BULLETIN 140. Occupational hazards at blast-furnace plants and accident prevention, based on records of accidents at blast furnaces in Pennsylvania in 1915, by F. H. Wilcox. 1917. 155 pp. 16 pls.

BULLETIN 196. Coal-mine fatalities in the United States, 1919, and coal-mine statistics supplementing those published in Bulletin 115, with a list of permissible explosives, lamps, and motor tests prior to January 31, 1920, by A. H. Fay. 1920. 86 pp.

TECHNICAL PAPER 245. Quarry accidents in the United States during the calendar year 1918, compiled by A. H. Fay. 1920. 52 pp.

TECHNICAL PAPER 252. Metal-mine accidents in the United States during the calendar year 1918, compiled by A. H. Fay. 1920. 113 pp.

TECHNICAL PAPER 256. Accidents at metallurgical works in the United States during the calendar year 1918, compiled by A. H. Fay. 1920. 23 pp.

TECHNICAL PAPER 266. Coke-oven accidents in the United States during the calendar year 1919, by W. W. Adams. 1920. 25 pp.

TECHNICAL PAPER 275. Quarry accidents in the United States during the calendar year 1919, compiled by W. W. Adams. 1920. 66 pp.

TECHNICAL PAPER 280. Accidents at metallurgical works in the United States during the calendar year 1919, compiled by W. W. Adams. 1920. 29 pp.

TECHNICAL PAPER 286. Metal-mine accidents in the United States during the calendar year 1919, by W. W. Adams. 1921. 99 pp.

TECHNICAL PAPER 288. Coal-mine fatalities in the United States, 1920, by W. W. Adams. 1921. 112 pp.

TECHNICAL PAPER 293. Coke-oven accidents in the United States during the calendar year 1920, by W. W. Adams. 1922. 32 pp.

TECHNICAL PAPER 295. Quarry accidents in the United States during the calendar year 1920, by W. W. Adams. 1922. 66 pp.

TECHNICAL PAPER 297. Metallurgical accidents in the United States during the calendar year 1920, by W. W. Adams. 1922. 28 pp.

TECHNICAL PAPER 299. Metal-mine accidents in the United States during the calendar year 1920, by W. W. Adams. 1922. 99 pp.

TECHNICAL PAPER 302. Coal-mine accidents in the United States during the calendar year 1921, by W. W. Adams. 1922. 72 pp.

### PUBLICATIONS THAT MAY BE OBTAINED ONLY THROUGH THE SUPERINTENDENT OF DOCUMENTS.

BULLETIN 69. Coal-mine accidents in the United States and foreign countries, compiled by F. W. Horton. 1913. 102 pp. 3 pls. 40 figs. 25 cents.

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